Documentation

HiPath 3000/5000 V8
HG 1500 V8

Administrator Documentation

A31003-H3580-M103-2-76A9

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Contents

1 Introduction

This document describes the configuration of HiPath 3000/5000 V8 - HG 1500 V8 and the tools available for it.

This chapter provides an overview of this manual. It describes:

- this manual’s target audience (see Section 1.1, "Target Audience"),
- the contents of each chapter in this manual (see Section 1.2, "Contents of this Manual"),
- the typographical conventions used (see Section 1.3, "Conventions Used").

1.1 Target Audience

This manual is intended for administrators who are responsible for the configuration of HiPath 3000/5000 V8 - HG 1500 V8. They should have experience in LAN administration and be familiar with the following areas:

- Data communications hardware
- WAN (Wide Area Network) concepts and terms
- LAN (Local Area Network) concepts and terms
- Internet concepts and terms

You should have received instructions from Siemens on the following:

- Installing and Starting Up HiPath 3000/5000 V8 - HG 1500 V8
- Configuring HiPath 3000/5000 V8 - HG 1500 V8 VoIP Functions
- Configuring and Customizing HiPath 3000/5000 V8 - HG 1500 V8 Data Communication Parameters

1.2 Contents of this Manual

This manual offers a full description of administration options for HG 1500 and also contains background information on selected topics.

It explains how the HiPath 3000/5000 V8 - HG 1500 V8 is to be administered after being installed in a subrack.

Initial setup must be performed at the start of administration. The necessary pre-administration steps are described in Chapter 2.

Further information on HiPath 3000/5000 V8 - HG 1500 V8 may be found in the HiPath 3000 Service Manual and the HiPath 3000 System Description.

Subsequent chapters provide a systematic description of the WBM interface for configuring and administering HiPath 3000/5000 V8 - HG 1500 V8.

No.	Chapter	Contents
1	Introduction	Defines the target audience and provides an overview of the documentation structure.
2	Preparing the Board	Lists the prerequisites for HG 1500 administration via WBM.
3	WBM	Describes the basic operating elements of the WBM user interface.
4	Front panel	Describes how to use the WBM module "Front panel", which allows the board operating functions to be monitored.
5	Wizard	Describes how to use the WBM module "Wizards" using the wizard for initial configuration.
6	Maintenance	Describes the use of the WBM module "Maintenance", for which a broad range of administration options is available.
7	Explorers	Describes the use of the WBM module "Explorers", for which numerous board settings are available.
8	Web Based Simulation Tool	Describes the installation and implementation of the WST.
9	Technical Concepts	Contains background data on board configuration options.
A	Terms and Abbreviations	Contains brief information on relevant terms and abbreviations.
B	Traces and Events	Documents possible trace and event messages
C	WAN/LAN Management	Describes TCP/IP commands under MS Windows, basic principles of IP network addressing, standard port numbers, etc.
D	Internet References	The listed Internet sources provide original or detailed information on technical standards used in HG 1500.
E	The CLI Command Interface	Describes possible CLI commands for board configuration via terminal.
F	Index	Index

Table 1-1 Chapter Overview

1.3 Conventions Used

The following display conventions are used in this manual:

Convention	**Example**
`Courier`	Input and output Example: Enter `LOCAL` as the file name. `Command not found`
Italics	Variable Example: *Name* can contain up to eight characters.
Italics	Indicates user interface elements Example: Click *OK* Select *Exit* from the *File menu.*
Bold	Special emphasis Example: This name must **not** be deleted.
`<Courier>`	Keyboard shortcuts Example: `<CTRL>+<ALT>+<ESC>`
>	Menu sequence Example: File > Exit.
Conventions Used	Cross-reference or hyperlink
ⓘ	Additional information
⚠	Warning of critical points in a procedure.

Table 1-2 Typographic Conventions

2 Preparing the Board

Notes on how to install the HG 3550/3540 V2.0 may be found in the corresponding AMO STMIB service manual or the HiPath 4000 HiPath Manager.

Once the HiPath HG 1500 has been installed, it must be started and configured for HTTP access via WBM. The start-up procedure and configuration options are described in this chapter.

> If you are using the HiPath HG 1500 for an Internet connection:
> An Internet connection always involves an elevated security risk. In order to keep risks to a minimum, we therefore recommend installing and using a security solution that satisfies security requirements.

2.1 Starting the HG 1500

When the system is started, the HiPath HG 1500 is automatically started as well. This initiates the firmware start routine, the gateway self test and the startup procedure.

2.1.1 Firmware Start Routine

The firmware is located in the flash memory and is started each time the system is rebooted. The firmware code resets the system and is the first code to be run when the power supply is switched on.

The firmware performs the following functions:

1. Initializes the hardware components of the board.
2. Tests the hardware components (Built-In Self-test BIST).
3. Creates the file system in the flash memory.
4. Activates the CLI handler).
5. Loads data from the flash memory (loading program).
6. Starts the application program.

The automatic boot procedure between steps 4 and 5 and can be interrupted, as described in Section 2.1.3, "Interrupting the Boot Procedure".

If the boot procedure is not interrupted, the gateway continues the boot procedure and can then be configured.

2.1.2 LED Startup Display

If there is no terminal connected to the V.24 interface of the board, the LEDs at the front of the HiPath HG 1500 display the main steps of the start routine.

The red LED remains illuminated at the beginning of the boot procedure. Once code loading has been initiated (see Section 2.1.1, "Firmware Start Routine", step 5), the red power supply LED flashes once per second. Once the LED has stopped flashing, the boot procedure is complete.

The gateway is operational approximately 30 s after the LED goes out.

> If a serial terminal is connected, the text *"System Running"* is displayed on the terminal as soon as the gateway is ready.

2.1.3 Interrupting the Boot Procedure

The boot procedure can be interrupted after the self-test by pressing any key on the terminal within three seconds of the *Press any key to Stop autoboot* message appearing on the screen.

If the boot procedure is interrupted in this way, the device switches to a special mode in which the system may have been configured to request the root administrator's password. In this case, enter the password. Access via Boot CLI is granted after logon. With boot CLI, booting can be manually controlled by entering boot commands and changing the start parameters. The boot CLI commands are described in the Section D.7, "Start command line".

To repeat the standard boot procedure, press `<CTRL>+X`.

2.2 Configuring the HiPath HG 1500

Before the HiPath HG 1500 can be administered, an IP address must be assigned to the board's LAN1 interface. The IP addresses can be assigned via CLI. Do this by connecting an appropriate terminal to the HiPath HG 1500's V.24 interface. Using CLI commands, you can configure IP addresses, subnet masks and default routers (for a detailed description, see Section 2.2.1, "Configuration via CLI Interface").

Once the HiPath HG 1500 has been assigned an IP address and has been rebooted, you can boot the board WBM via a Web browser in the network (see Chapter 3, "WBM").

> Information about the IP protocols and port numbers used in HiPath 2000 V1.0 can be found in Appendix C of the HiPath 2000 Service Manual.

2.2.1 Configuration via CLI Interface

Configuring CLI:

1. Connect a serial terminal or a PC with a VT 340 terminal emulation program (e.g. HyperTeminal) to the HiPath HG 1500 V.24 interface.

   The connection requires the following settings:
   Baud rate: 19200, Data: 8 bit, Parity: none, Stop bits: 1, Data flow control: none.

2. Start the HiPath 3000 system.

3. Press any key to display the `please log in` prompt. Log on by entering the user name and password. The user name and password are specified in the HiPath 3000 system using HiPath 3000 Manager E.

4. Activate the write access:

   ```
   get write access
   ```

   If the command is correct, *OK* is displayed.
   The same applies to all subsequent entries.

Assigning an IP address to the HiPath HG 1500 LAN1 interface:

1. Set up the gateway IP address (LAN1 interface) by entering the following:

   ```
   set ip address xxx.xxx.xxx.xxx
   ```

   where *`xxx.xxx.xxx.xxx`* is the IP address (number).

2. Set up the subnet mask for the gateway by entering:

   ```
   set ip subnet yyy.yyy.yyy.yyy
   ```

   where *`yyy.yyy.yyy.yyy`* is the address mask.

   Example of a Class C subnet:

   ```
   255.255.255.0
   ```

Saving entries and rebooting the HiPath HG 1500:

1. Save the configuration by entering the following:

   ```
   save configuration
   ```

2. Start the gateway by entering:

   ```
   reset
   ```

Assigning a default router:

1. Assign a default router to the gateway by entering:

   ```
   set Default Gateway zzz.zzz.zzz.zzz
   ```

   where `zzz.zzz.zzz.zzz` is the IP address of the router in the customer network.

2. Re-save the configuration with:

   ```
   save configuration
   ```

2.2.2 Configuration via HiPath 3000 Manager E

To access the gateway via PPP using any connection (analog or ISDN), a PSTN peer with an activated service entry must be created.

If the HiPath HG 1500 database is empty, service entries can be automatically created using HiPath 3000 Manager E. The following service entries are possible:

- Service entry for remote access via an asynchronous modem (V.34).
- Service entry for remote access via an ISDN card (HDLC).

Working in HiPath 3000 Manager E:

1. Reading the HiPath 3000 customer database memory (CDB):
   File > *Transfer* > *Read/write database* > *System* > *PC*.

2. Configure S_0 subscribers (e. g., with one of the following values):

HiPath 3800	748
HiPath 3550	686
HiPath 3350	69

3. Reading out board information:
   File > *Transfer* > *Maintenance* > *Restart/reload* > *Read card information*.

   All gateways and slot specifications are listed in the *HXG – Remote Initial Startup* section. Under DID for the relevant gateway, enter the extension that you configured in step 2.

4. Click *Accept data*.

   A PSTN peer is then automatically configured on the HiPath HG 1500 with the following parameters:

Peer Name	Remote default
IP Address of PSTN Peer	10.186.237.64
IP Address of Local PSTN Interface	10.186.237.63

MSN/DID Number	Specified DID
V.34 Peer	Yes
V.110 Peer	No
CHAP Authentication Mode	CHAP Host
CHAP Password	HiPath 3000 Manager E password
PPP User name	HiPath 3000 Manager E user name

5. Optionally, the same procedure can be repeated with an additional S_0 station number (Recommended value: HiPath 3800 = 749, HiPath 3550 = 687, HiPath 3350 = 70). A second PSTN peer is then automatically configured with the following parameters:

Peer Name	Remote ISDN
IP Address of PSTN Peer	10.186.237.66
IP Address of Local PSTN Interface	10.186.237.65
MSN/DID Number	Specified DID
V.34 Peer	No
V.110 Peer	No
CHAP Authentication Mode	CHAP Host
CHAP Password	HiPath 3000 Manager E password
PPP User name	HiPath 3000 Manager E user name

Configuring the access PC:

Set up the following dial-up connection on a PC with a modem or an ISDN card:

Connection Type	Internet
Station number	MSN of the PSTN peer entry
Connect via	Modem or ISDN card
Type of dial-up server	PPP
Request password (CHAP: encrypted, PAP: unencrypted)	Yes
User name	User name as specified in HiPath 3000 Manager E
ID	ID as specified in HiPath 3000 Manager E

Establishing the connection to the HiPath HG 1500:

If you have selected the proxy server option in the Web browser: Add the Gateway IP address to the proxy settings for which there is no proxy server being used.

Example:

Asynchronous connection	10.186.237.63
HDLC connection	10.186.237.65

You can now administer the board via the WBM. The address of the example given above is:

Asynchronous connection	http://10.186.237.63:8085
HDLC connection	http://10.186.237.65:8085

3 WBM

WBM stands for **W**eb **B**ased **M**anagement. The WBM is the default administration interface in HG 1500.

Any PC with a TCP/IP-supported network connection and a compatible web browser can access the WBM user interface after successfully logging on. The WBM features an integrated Web server so that the WBM can be accessed over an HTTP URL (or an HTTPS URL if SSL is enabled).

The WBM user interface is available in German and English. The language can be set via the Web browser's language setting.

Hardware requirements:

To operate WBM, you will need a PC with the following minimum requirements:

- 128 MB main memory (RAM),
- 400 MHz processor speed,
- a mouse with left and right buttons.

Software requirements:

WBM is composed of HTML/XSL pages with frames. To use it, the following must be installed:

- Windows NT 4.0, 2000 or XP
- Microsoft Internet Explorer 5.5 or 6.0
- Java Plug-In JRE 1.3.1,
- XML Extension DLL V3.0 SP2 or SP4,
- The following settings must be made in Microsoft Internet Explorer:
  - Allow use of ActiveX and Java
  - Activate the following option: *Tools* -> *Internet options* -> *Advanced* -> *Empty temporary Internet files when browser is closed*
  - The administration PC may not be connected to the gateway via a proxy server. Therefore activate the following option if necessary: *Tools* -> *Internet options* -> *Connections* -> *LAN settings: Settings...* -> *Proxy server: Bypass proxy server for local addresses*

ⓘ If a DNS server is configured on the administration PC but is not reachable, the WBM interface operates at a considerably slower speed, especially when loading Java applets. If you experience a situation like this, check the DNS server set in the Administration PC's network settings. Remove unreachable DNS servers or enter reachable servers.

Miscellaneous requirements:

HiPath HG 1500 must be configured and started. All activities described in Chapter 2, "Preparing the Board" must have been performed.

Overview

You can activate the WBM from the Web browser – see Section 3.1, "Starting WBM". You can administer all accessible board parameters over the Web-based interface – see Section 3.2, "WBM Application Interface". A CLI access can also be used for a number of parameters – see Section 3.3, "Alternative Management over CLI (Console)".

You can also call up information on the board's integrated SNMP agents using SNMP Management software – see Section 3.4, "SNMP Management".

In addition to the WBM, the HiPath 3000 Manager E is also provided for overall system administration – see Section 3.5, "HiPath Management with HiPath 3000 Manager E".

3.1 Starting WBM

User Account

The "Administrator" user ID is available for use with WBM. This ID enables you to access configuration settings. You can use the initial installation wizard to configure several basic settings.

The default user name and password is: **31994**. You may change this default data.

Starting the WBM session

Close all browser windows before you start a new WBM session. To activate WBM on HG 1500:

1. Open the Internet Explorer. Note the language setting: If you want to use the WBM in English, the language setting for the browser (menu *Tools* > *Internet Options* > *Language*) must be set first to *English (USA) [en-us]*.

2. Enter the IP address assigned to the HiPath HG 1500 as the URL: `http://num.num.num.num:8085` (where `num` is a number between 0 and 255).

   A login page with the following fields appears when you log on to a session for the first time:

3. *Username*: Enter the default user name.

4. *Password*: Enter the default password.

   As soon as you have been successfully authenticated, a cookie containing your user name and expiration date will be saved on your PC. From then on, the cookie is used for WBM access authentication. If no valid cookie is found, the login window will reappear.

> ℹ For security purposes, individual user accounts should be set up. Real security cannot be guaranteed as long as you are only using the predefined user account. User accounts are administered in HiPath Manager 3000 E.

5. Click *Login*.

   The WBM download operation begins. Wait until the WBM home page has been completely loaded.

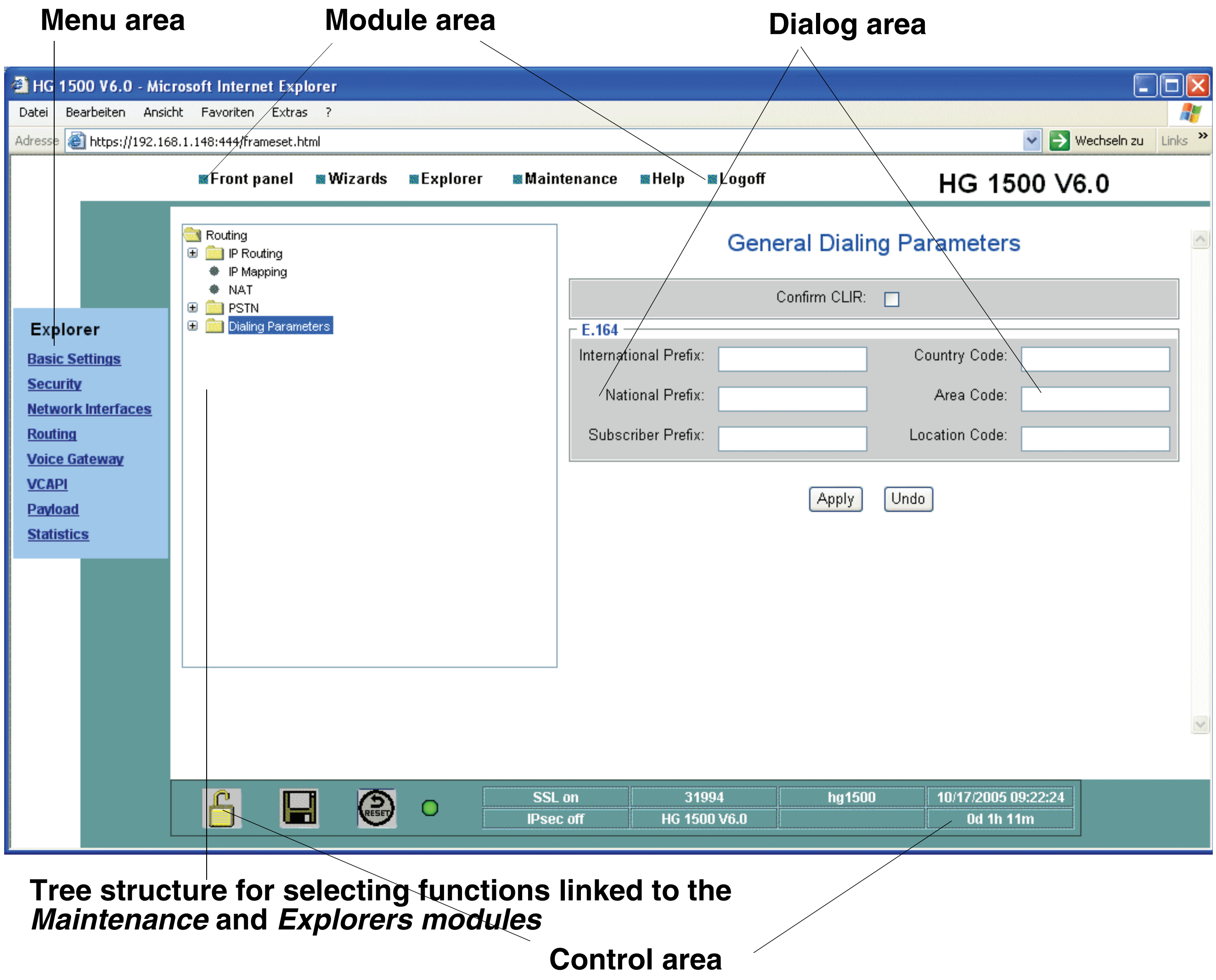
> ℹ Up to five sessions can be active simultaneously. An attempt to open a sixth session is denied with a message stating that five sessions are already active. The local management application issues a warning if another session already has write access when write access is requested. The options available to administrators are not restricted by this, however. We therefore urge you to take organizational measures to ensure that no two administrators attempt to process the same object simultaneously.

Ending WBM:

See Section 3.2.1.6, "Logoff".

3.2 WBM Application Interface

The main window in WBM consists of the following areas:



General Dialing Parameters

Confirm CLIR: □

E.164

International Prefix:
Country Code:
National Prefix:
Area Code:
Subscriber Prefix:
Location Code:

Module area:

The area under the banner displays the modules available. You can select the required module by clicking its name. See Section 3.2.1, "Modules".

Menu area:

The area at the left is used for navigating within a module. The menus that are displayed here vary depending on the module selected.

Control area:

The icons for controlling WBM and the status information that is constantly displayed are located at the bottom. For information on the meaning of the icons, see Section 3.2.2, "Icons in the WBM Window’s Control Area".

Tree structure for selecting functions linked to the "Maintenance" and "Explorers" modules

This area displays an Explorers-type tree structure where you can select individual functions.

3.2.1 Modules

The area under the banner displays the modules available. You can select the required module by clicking its name.

The module’s name is displayed in red italics when activated and module-specific options appear in the menu area.

Modules available:

> Front Panel
> Wizards
> Explorers
> Maintenance
> Help
> Logoff

3.2.1.1 Front Panel

In this module, you can monitor the general functions of the gateway using a schematic view of the front panel. The status information is displayed with LEDs.

WBM path:

WBM > *Front panel*

A diagram of the board’s front panel is displayed, see Chapter 4, "Front panel".

3.2.1.2 Wizards

The Wizards module for the initial setup combines all operations required for initial gateway configuration. It guides you through the procedure step by step so that all the required settings are performed.

WBM path:

WBM > *Wizards*

The *Wizards* module's options are displayed on the left.

Options in the *Wizards* module:

> Initial Setup

For a detailed description of the functions of the *Wizards* module, see Chapter 5, "Wizard".

3.2.1.3 Explorers

This module contains all the functions necessary for configuring HG 1500.

WBM path:

WBM > *Explorers*

The *Explorers* module's options are displayed on the left.

Options in the *Explorers* module:

> Basic Settings
> Security
> Network Interfaces
> Routing
> Voice Gateway
> VCAPI
> Payload
> Statistics

For a detailed description of the functions of the *Explorers* module, see Chapter 7, "Explorers".

3.2.1.4 Maintenance

This module contains all the functions necessary for HG 1500 maintenance and administration.

WBM path:

WBM > *Maintenance*

The *Maintenance* module's options are displayed on the left.

Options in the *Maintenance* module:

> Configuration
> Software Image
> Firmware
> Multigateway Administration
> Job List
> Traces
> Events
> SNMP
> Admin Log
> Actions

For a detailed description of the functions of the *Maintenance* module, see Chapter 6, "Maintenance".

3.2.1.5 Help

This module offers the following options:

> *About WBM* (information page)
> *HG 1500 Docu* (online help on WBM)
> *HiPath home page* (link to the Siemens Web range of HiPath solutions)

All references are displayed in a new browser window. The browser window containing the WBM remains open. You can have both windows open simultaneously and switch from one to the other over the Windows task bar.

> Where applicable, the online help storage location must be configured using the WBM (see Section 7.1.10.2, "Edit Online Help Directory").

3.2.1.6 Logoff

Click *Logoff* to terminate the connection to the gateway and close the WBM session. To save all configuration changes permanently, click the Save icon in the control area before logging off (see Section 3.2.2, "Icons in the WBM Window’s Control Area").

WBM path:

WBM > *Logoff*

If you have not saved your configuration changes or reset the board before logging off (the corresponding Icons in the WBM Window’s Control Area are red), the following warning is displayed:

```
You modified data which has not yet been saved. In order to save your
data or reboot you must login to WBM again.
```

Confirm this warning with *OK*. The logoff procedure resumes and finishes. You are now logged off the telephone system. Even if you have logged off, WBM still expects modified data to be saved. The previous warning is shown again the next time you log on and off.

Automatic logoff:

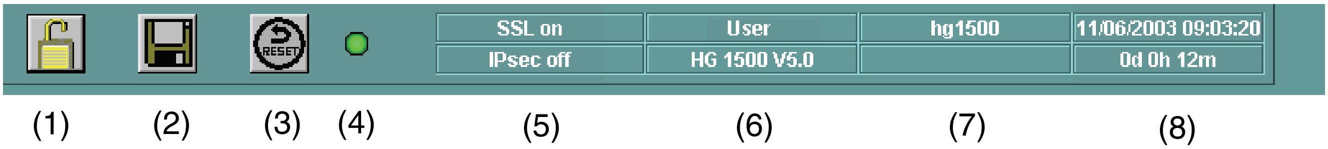
If you close the browser after you have saved your configuration changes, you are automatically logged off HG 1500. The following message is displayed:

```
You have left the WBM page without logoff. You will be logged out au-
tomatically form the telephone system.
```

If you have not yet saved your configuration changes, the previous warning is displayed prior to this message.

3.2.2 Icons in the WBM Window’s Control Area

The control area is an applet that constantly provides control and status information. The figure below shows an example:



Not all the control icons are always active. Inactive icons are grayed out.

The following control icons are available:

- Padlock icon (1),
- Save icon (2),
- Reset icon (3),

- Activity icon (4).

The following status information is also displayed:

- Status of SSL and IPsec security functions (5),
- Zustandsinformation der Sicherheitsfunktionen SSL (5),
- Access category of the user and system version (6),
- System name and location (7),
- System date and time, and how long since the last restart (8).

Padlock icon (1)

This icon indicates the current write access status for the administered gateway. The following two statuses are possible:

🔒 Data input is blocked. You can read data but you cannot enter or modify it.

🔓 Data can be entered. You have read and write access.

The gateway status changes when the padlock icon is clicked.

If data input is blocked, clicking the icon will immediately activate write access from this PC, provided that no other administrator currently has write access.

If data input is blocked and write access is currently activated at another PC, a warning message will be displayed when you click the Padlock icon. The program queries whether write access should be transferred to this administrator. If *Yes* is clicked, write access will be transferred from another PC to this administrator’s computer.

If you click the Padlock icon while write access is still active on the current PC, write access will be granted, regardless of whether data has been saved. If data has yet to be saved and/or a restart is required but has not yet been performed, the relevant control icons will indicate the present status when write access is next activated.

Save icon (2)

This icon saves modified data. It can assume three statuses:

Data input is blocked. Users can read data, but they cannot edit entries.

Data can be entered but no changes have yet been made. (Data in the RAM is identical to that in the flash memory.)

Data can be entered. Data has been modified but not saved. (Data in the RAM differs from that in the flash memory.)

Changes are always made to the configuration that was active at the start of the session or to the last configuration saved during the session. The modified configuration in the RAM is saved as a new configuration in the flash memory.

Reset icon (3)

This icon triggers a gateway restart. It can assume three statuses:

Data input is blocked. Users can read data, but they cannot edit entries.

Data input is active but no restart is required.

Data input is active. Data has been modified. The gateway must be restarted to activate the modified configuration.

Clicking the Reset icon will delete any unsaved changes which were made since the start of the session or since the last time the configuration was saved. A warning is displayed before unsaved data is deleted. If you click *OK*, the gateway will restart and the configuration from the flash memory will overwrite the configuration in the RAM.

Action icon (4)

The icon turns green to indicate a live connection to the HG 1500 Web server. The icon flashes red when there is no connection set up.

3.2.3 Icons in the WBM Tree Representations

The functions available in the *Maintenance* and *Explorers* modules are displayed in the contents area in a tree representation similar to Windows Explorer. This tree representation has the following icons:

- Directories

📁 Main directory closed. The name of the activated function appears next to the main directory.

📂 Main directory open. The usable functions and/or additional directories are displayed under the main directory.

⊞ 📁 Any directory that contains hidden functions is characterized by a plus sign (+). A double-click will display these functions.

⊟ 📂 The functions in this open directory are displayed. A double-click will hide these functions.

📁 📁 Colors are used in the "Explorers" module under "Security": Red for disabled, green for enabled.

Internet Telephony Service Provider
The color of the bullet point or of the directory indicates the Internet telephony service provider status:

- ● 📁 Gray bullet point or yellow directory – the provider has been created but not activated.
- 🟢 📁 Green – the provider is activated and registered. No errors have occurred.
- 🟠 📁 Orange – the provider is activated but at least one error has occurred in conjunction with the assigned users.

- Bullet points

········● This function can be activated but does not have status information (color: Gray).

········🔵 This symbol denotes settings which can be reset to factory defaults (color: Blue).

········🟢 This function is active and can be deactivated via a context menu (color: Green).

┈◆ This function is inactive and can be activated via a context menu (color: Red).

- Context menus

  A context menu opens when you right-click a directory or bullet point. If a display function is included in the context menu, you can open this directly by simply clicking the directory or bullet point.

3.2.4 Dialogs and Dialog Elements

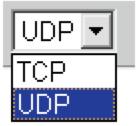
Inputs and changes in the WBM are displayed in the browser window as dimmed dialogs within the browser window. Separate dialog windows can also be displayed, for example, to confirm a delete request.

The dialogs contain the following typical elements:

Input fields

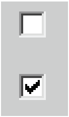
For entering numeric or alphanumeric values. The relevant field label is displayed before, after or over the field. For security purposes, characters are exclusively displayed as unambiguous symbols, such as stars, in password fields. Characters unavailable on the keyboard can be inserted using the "Charmap" character table, for example, under MS Windows.

Selection lists



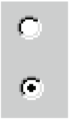
Click the arrow to open or close the list. Select an entry with a left-click.

Check box



(Here, the upper checkbox is deactivated while the lower one is activated): The relevant field label is displayed before, after or over the field. Click to activate or deactivate the relevant option.

Radio button



(Here, the upper checkbox is deactivated while the lower one is activated): Radio buttons are combined in groups where one element is always selected. The relevant field label is displayed before, after or over the field. Click to activate or deactivate the relevant function.

Buttons

Click to perform the action described by the button’s label text. The texts are self-explanatory, for example, *Send* or *Delete*.

The following default buttons are used:

- *Apply*: Data or changes entered are buffered in the RAM and, where applicable, verified. To save entries and changes permanently, click the Save icon in the control area. (see Section 3.2.2, "Icons in the WBM Window’s Control Area").
- *Undo*: Data or changes entered in the dialog are discarded. The original status of the dialog is restored.
- *OK*: Positive acknowledgement of separate dialog windows. The selected action is performed if you click this button (no undo available).
- *Cancel*: Negative acknowledgement of separate dialog windows. The selected action is cancelled if you click this button.
- *Next Page*: Change to the next Web page within a multi-page dialog. This button is currently only used in wizards (see Chapter 5, "Wizard").
- *Previous Page*: Change to the previous Web page within a multi-page dialog. This button is currently only used in wizards.

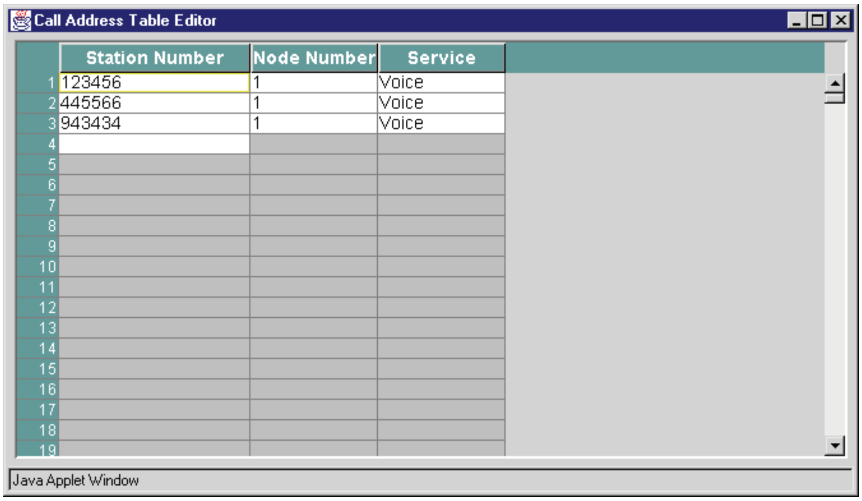
3.2.5 Table Editor

A Table Editor is available for a number of functions to simplify the task of processing multiple data records in one go. The possible parameter inputs are described in detail under the WBM input windows.

The Table Editor appears in a separate window that can be minimized, maximized or closed using conventional Windows tools.

Example of an editable table

The following is an example of an editable table:



	Station Number	Node Number	Service
1	123456	1	Voice
2	445566	1	Voice
3	943434	1	Voice
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			

3.2.5.1 Table Display

The following rules apply to table display:

- **Line display**
  The number of lines displayed always matches the maximum number permitted here. Unused lines are dimmed.
- **Scrolling up or down**
  If the number of lines displayed is too large for the display area, a scroll bar appears on the right which can be used to browse up and down.
- **Changing the column width**
  In the table header, click between the columns (to the right of the column to be modified) and, holding the mouse button down, drag the column to the right (to increase the column width) or left (to reduce the column width). Release the mouse button when you reach the desired column width.
- **Rearranging columns**
  Click the title of the column that you want to move as a whole. Hold down the mouse button and drag the column left or right to the required position. The remaining columns align themselves on the basis of the position of the shifted column.
- **Sorting the table**
  Right-click the title of the column that you want to use as the ascending or descending sort criterion. A context menu appears in which you can set the sort sequence:
  Sort A … Z: ascending order
  Sort Z … A: descending order

3.2.5.2 Processing Table Cells

Table cells can be processed as follows:

- **Selecting a cell**
  Click the title of the column that you want to move as a whole.
- **Selecting multiple cells**
  Click the cell in the upper right corner of the area to be marked. Hold the mouse button down, drag the mouse to the lower left corner of the area to be selected and release the mouse button.
- **Overwriting a value in a cell**
  For cells with values that can be overwritten:
  Double-click the cell containing the value to be overwritten. The cell becomes active and the cursor starts flashing to indicate that the entry can now be manually modified in the usual manner for Windows applications.

- **Selecting a value from a cell in a drop-down list**
  For cells with values that can be selected from a list:
  Click the cell. A drop-down list appears containing the possible options for this cell.
- **Deleting rows**
  Select the rows to be deleted. Right-click and select "Delete" from the context menu. Deleted rows are grayed out and shifted to the bottom of the table the next time the table is sorted or opened.
- **Copying cells**
  Select the cells to be copied. Right-click and select "Copy" from the context menu. Alternatively, you can copy the selected cells with the key combination `<CTRL>+C`. The selected area is transferred to the clipboard.
- **Pasting cells**
  Select the area where the clipboard contents should be inserted. Right-click and select "Paste" from the context menu. Alternatively, you can paste the selected cells with the key combination `<CTRL>+V`. The clipboard contents cannot be copied to other applications.
- **Resetting row defaults**
  Select the rows to be changed. Right-click and select "Default" from the context menu. The cells in the selected area are reset to the default values.
- **Applying changes**
  Move the cursor to the table area. Right-click and select "Apply" from the context menu. Then click the Save icon in the control area. The changes made do not take effect in the configuration file until this is done.

3.3 Alternative Management over CLI (Console)

For a detailed description of the CLI commands available, see Appendix D, "The CLI Command Interface".

3.4 SNMP Management

SNMP (**S**imple **N**etwork **M**anagement **P**rotocol) has been created for use with network management systems (NMS). NMS uses SNMP to integrate the management of network elements from different manufacturers.

HiPath HG 1500 contains an SNMP agent which accesses a standard MIB 2 as well as one for the specific private MIB. Authorized persons can read out administration and configuration data via SNMP. Some settings in HiPath HG 1500 can be modified via SNMP.

Both MIBs are available to administrators if a standard operating environment (for example, HP OpenView) is used.

HiPath HG 1500 can limit SNMP access to certain IP addresses, enabling data to be read out or modified via the NMS by authorized administrators only.

Read-only access

- MIB II (Management Interface Base); RFC 1213,
- HG1500MIB (HLB2 configuration and statistics),
- RG2500MIB (MIB for some routing functions),
- HiPathCommonMonitoringMIB (commonNotificationGroup only).

Write access

- MIB II (system group, TrapDestTable),
- HG1500MIB (control group),
- HiPathCommonMonitoringMIB (IPConnControlTable).

SNMP traps

SNMP can be used to generate traps. Changes to the existing conditions or the gateway status are transferred by the trap in real time. If a trap is generated, HiPath HG 1500 sends a PDU (Protocol Data Unit) trap to the SNMP agent which then forwards it to the NMS.

3.5 HiPath Management with HiPath 3000 Manager E

HiPath 3000 Manager E is an independent tool. It can be installed, for instance, on a server PC with HiPath 5000 RSM server software or on a service PC. In the HiPath 5000 network, all relevant network sections are displayed as a virtual HiPath system.

The program is a 32-bit application and can run under Windows 95, 98, ME, NT4.0 and 2000 operating systems.

The HiPath 5000 system can only be managed by one HiPath 3000 Manager E at any given time. The IP address of the Management Client as well as the beginning and end of the session are logged at each session. Modified data continues to be logged in the HiPath 5000 nodes.

In the HiPath system, HiPath 3000 Manager E takes priority over other running applications. This means that the modified data is stored in the HiPath 5000 database and a message is issued to alert the application of the change.

HiPath 3000 Manager E cannot be used to configure HG 1500 for the first time. However, a link to HG 1500 is displayed. This link is always available. You are automatically logged onto HG 1500 when you enter the password in HiPath 3000 Manager E.

A description of HiPath 3000 Manager E can be found in the HiPath 5000 system documentation.

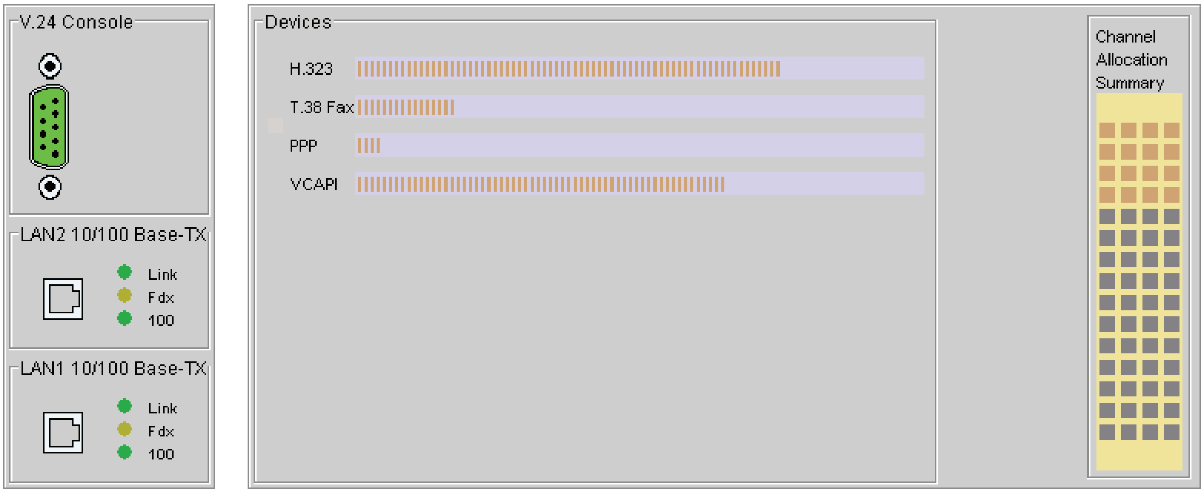
4 Front panel

The connection field view contains icons that give direct access to the current status of important hardware elements and logical units.

WBM path:

WBM > *Front panel*

A mask such as the following is displayed:



The individual elements of the connection field are described below.

V.24 Console

The icon indicates the V.24 interface.

LAN (10/100 Base-TX)

The icon displays the operating status of LAN interfaces 1 and 2 (top field: LAN2 interface, bottom field: LAN1 interface).

Icon	Status
Green	LAN interface is active
Red	LAN interface is inactive

Table 4-1 Status of LAN interfaces

In addition, colored icons display the communication status:

Icon	Status
Link (green)	Constantly illuminated: physical LAN connection exists and is correctly wired Not illuminated (dark green): LAN connection faulty
Fdx (yellow)	Constantly illuminated: full duplex operation Not illuminated: half duplex operation
100 (green)	Constantly illuminated: Transfer rate: 100 Mbps Not illuminated: Transfer rate: 10 Mbps

Table 4-2 Communication status of LAN interfaces

Devices

The bars indicate LAN device usage for the devices available. If you point to a device bar, an information window explaining the meaning of the current display appears:

- Maximum number of connections (full bar length).
- Reserved connections.
- Connections set up (green part of the bar).

Channels

The maximum number of usable B channels for the existing devices is displayed as a row of squares. The squares specify the current status of the channels according to a color scheme.

A summary of all licensed, available, used and reserved channels is shown on the right.

Channel	Status
🟩	Green: in use
🟫	Brown: available, not in use

Table 4-3 Status of individual channels

5 Wizard

> Wizards are only available if write access is provided. Write access is activated and deactivated with the padlock icon (see Section 3.2.2, "Icons in the WBM Window's Control Area").

A wizard is made up of a number of dialogs that are called up one after the other. You can scroll through the dialogs with Buttons *Next Page* and *Previous Page*. Specific complex tasks can be performed by completing all dialogs in a wizard.

WBM currently supports a wizard for Initial Setup.

5.1 Initial Setup

Appropriate preparations should be made to organize the configuration of HG 1500 before starting this wizard so that the wizard's dialogs can be processed without unnecessary interruptions. Above all, ensure that the gateway was assigned the correct IP address before connecting it to the network. See also Section 2.2.1, "Configuration via CLI Interface".

Using the wizard for initial setup, you can:

- Enter the name and location of the gateway as well as a contact address,
- Configure the second LAN interface, and
- Configure Codec parameters.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Wizard > *Initial Setup*

The mask for Gateway Properties is displayed.

5.1.1 Gateway Properties

The slot number, gateway IP address, and the subnet mask are displayed for information purposes. You can edit the following fields:

- *System Name*: Name of the system. Enter a character string in this field.
- *Gateway Location*: Information on the location of HG 1500. This information helps service technicians to locate the gateway when the device has to be physically accessed. Enter a character string.
- *Contact Address*: Information on a contact person. Enter a character string.

- *Enhanced B Channels*: Select this option if you want to use up to 60 B channels (disabled: up to 32 B channels).
  You cannot use the internal firewall and VPN/IPsec features if you activate the Enhanced B Channels option. If these features are active, a warning is output when you try to enable them. The features will be disabled if you confirm this warning with "OK".
- *DMC Interworking*: This entry indicates if DMC Interworking is active.
- *Use Gatekeeper*: In this field, select the gatekeeper where the HG 1500 must register. *Cisco* must be set for a Cisco gatekeeper. *OpenScape Voice* must be set for a gatekeeper in OpenScape Voice. You can use *default* for all other scenarios.

Click *Apply* followed by *OK* in the confirmation mask and click *Next Page* to buffer your inputs and open the dialog for LAN2.

5.1.2 LAN2

Background information:

See Section 9.1, "Environmental Requirements for VoIP"
See Section 9.2, "Bandwidth Requirements in LAN/WAN Environments"
See Section 9.3, "Quality of Service (QoS)"

The dialog display format and input fields are dependent on the operating mode currently active at the second LAN interface.

- *Use the Second LAN as*: Select the required operating mode for the second LAN interface. The following options are available:
  - *Not configured or deactivated*: The second LAN interface should not be used.
  - *PPTP*: If PPTP is activated, an attempt is made to immediately connect to the PPTP server.
  - *LAN2*: The second LAN interface should be used for direct connection to the LAN. If you select it, the Dialog for the operating mode: LAN2 is displayed.
  - *DSL Connection Type PPTP*: The second LAN interface should be used for a "Point-to-Point Tunneling Protocol" DSL connection. An advisory message appears when you select this option which you must confirm with *OK*. The Dialog for the operating mode: DSL Connection Type PPTP is then displayed.
  - *DSL Connection Type PPPoE*: The second LAN interface should be used for a "Point-to-Point over Ethernet" DSL connection. An advisory message appears when you select this option which you must confirm with *OK*. The Dialog for the operating mode: DSL Connection Type PPPoE is then displayed.

5.1.2.1 Dialog for the operating mode: LAN2

You can make the following entries:

- *IP address*: Specify the IP address of the interface in this field.
- *IP Netmask*: Specify the subnet mask in this field.

The MAC address of the board is displayed here for information purposes.

- *Ethernet Link Mode*: Select the operating mode for the LAN interface:
  - *Auto***:** Automatic switching between 10 and 100 Mbps and half duplex and full duplex mode
  - *10HDX*: 10 Mbps, half duplex
  - *10FDX*: 10 Mbps, full duplex
  - *100HDX*: 100 Mbps, half duplex
  - *100FDX*: 100 Mbps, full duplex
- *Maximum Data Packet Size (Byte)*: Enter the maximum packet length in bytes that should apply for this IP protocol. Values between 576 and 1500 are permitted.
- *Network Address Translation*: Select this option if you want to activate the function for masking private (internal) IP addresses.
- *QoS Capability of Peer*: Select one of the possible settings from the context menu:
  - *Identical*: Both "DiffServ" and "IP Precedence" are accepted for the evaluation.
  - *DiffServ*: The transmission partner prefers to work with the evaluation of the "Differentiate Services" 6-bit field (newer procedure).
  - *IP Precedence*: The transmission partner prefers to work with the evaluation of the "IP Precedence" 3-bit field (older procedure).
- *Bandwidth Control for Voice Connections*: Bandwidth control prevents the transmission rates available from being overbooked with voice connections within a multi-link connection. In other words, when header compression is active, a maximum of five voice connections (G.729/60 msec or G.723/60 msec) is permitted over a B channel. Select this check box if you want to activate the "Bandwidth Control for Voice Connections" function. This function only affects connections from one HG 1500 to another.
- *Bandwidth of Connection (Kbps)*: Enter the bandwidth of the connection in kilobits per second.
- *Bandwidth Used for Voice/Fax (%)*: Specify the percentage of bandwidth that should be used for voice/fax connections.

- *IEEE802.1p/q tagging*: This option can be used to set the Ethernet format that is sent by the board. The option is normally deactivated. If you select this function, the following fields are added to the dialog:
  - *IEEE802.1p/q VLAN ID*: When the IEEE802.1p/q option is active, you can enter a value that differs from the default value "0" as the VLAN’s ID number if the switch used has problems with the default value.
  - *Excellent Effort*: Enter a value for the priority of the layer 2 QoS class "Excellent Effort". Values between 0 and 7 are permitted.
  - *Controlled Load*: Enter a value for the priority of the layer 2 QoS class "Controlled Load". Values between 0 and 7 are permitted.
  - *Guaranteed Service*: Enter a value for the priority of the layer 2 QoS class "Guaranteed Service". Values between 0 and 7 are permitted.
  - *Network Control*: Enter a value for the priority of the layer 2 QoS class "Network Control". Values between 0 and 7 are permitted.

> The interface partners must be identically configured to guarantee LAN functionality.

Click *Apply*, then select *Next Page* to buffer your inputs and open the dialog for Codec Parameters.

5.1.2.2 Dialog for the operating mode: DSL Connection Type PPTP

You can make the following entries:

IP Parameters

- *Remote IP Address of the PPP Connection*: Enter the IP address of the remote end of the PPP connection in this field. If this PPP connection is used for Internet access, this entry is only necessary if the Internet Service Provider uses a static IP address.
- *Local IP Address of the PPP Connection*: Enter the IP address of the local HXG3 board in this field. If this PPP connection is used for Internet access, this entry is only necessary if the Internet Service Provider assigned you a static IP address.
- *Maximum Data Packet Size (Byte)*: Enter the maximum packet length in bytes that should apply for this IP protocol. Values between 576 and 1500 are permitted.
- *Negotiate IP Address*: Specify if connection partners have to negotiate the IP address at connection setup.

General PPP Parameters

- *Default Router*: Activate this option if you want to use the DSL connection configured here as a routing destination. Please note that you can only have one default router: this is either the DSL access configured here or an individual PSTN peer – see also Section 7.4.4, "PSTN".
- *Internet Access with DNS Request*: Specify if you want to use the access for Internet access. Note that only one Internet access may be activated per HiPath 3000/5000 V8 - HG 1500 V8 (either one PSTN peer or one DSL connection).
- *Name of the Internet Service Provider*: Enter a name of your choice here with which you can identify the ISP.
- *PPP Default Header*: Specify whether the "default header" should be transferred for the recipient.
- *IP Header Compression*: Specify whether TCP headers should be compressed. UDP and RTP headers are always compressed.
- *Send LCP Echo Request*: Specify if an LCP echo request should be sent. This function is used to check if the connection is still active.
- *Automatic PPP Connection*: Specify if the PPP connection should be automatically established at system startup.
- *Automatic PPP Reconnection*: Specify if the PPP connection should be automatically reestablished after a connection cleardown (for example, in the case of ISP access with flat rate and forced cleardown after 24 hours).

PPTP Parameter

- *Local IP Address of the Control Connection*: Enter the IP address of the HiPath HG 1500 used for PPTP connections. The default value is 10.0.0.140. The addresses 0.0.0.0 and 255.255.255.255 are not allowed.
- *Remote IP Address of the Control Connection*: Enter the IP address of the host computer to which the PPTP connection should be established. The default value is 10.0.0.138. The addresses 0.0.0.0 and 255.255.255.255 are not allowed.
- *Remote Netmask for the Control Connection*: Enter the netmask for the PPTP connection in this field.

Short Hold

- *Short Hold*: Select this check box if you want to activate the "Short Hold" function.
- *Short Hold Time (sec)*: Enter the inactivity timeout after which the connection should be cleared down. The connection will be reestablished automatically as soon as new data packets are received. The short-hold timer is only triggered by outgoing packets.

Authentication

- *PPP Authentication*: Specify whether authentication should be performed. If you select this function, the following fields are added to the dialog:
  - *PAP Authentication Mode*: Specify which type of authentication should be used for the PPP connection (PAP Client, PAP Host, not used).
  - *PAP Password*: Specify the password to be entered by the user for identification in the case of PAP authentication. Data cannot be entered in the field if PAP authentication is not used.
  - *CHAP Authentication Mode*: Specify which type of authentication should be used for the PPP connection (CHAP Client, CHAP Host, CHAP Client and Host, not used).
  - *CHAP Password*: Specify the password to be entered by the user for identification in the case of CHAP authentication. Data cannot be entered in the field if CHAP authentication is not used.
  - *PPP User Name*: Enter a user name of your choice that should be used for authentication via PAP or CHAP.

Data Compression

The STAC and MPPC compression algorithms are available for compressing PPP data packets. STAC is widely used in the UNIX world, while MPPC is the Microsoft alternative. Both algorithms offer similar compression results. MPPC features a more robust resynchronization mechanism to deal with packet loss and is the preferred option if transmission quality is low. Please note that pre-compressed data (.ZIP files) and files containing binary data (for example, audio/video files, *.exe files, etc.) cannot be compressed further and thereby transmitted quicker.

- *STAC Data Compression*: Specify whether STAC should be used for data compression.
- *MPPC Data Compression*: Specify whether MPPC should be used for data compression.

Address Translation

- *NAT*: Specify whether the "Network Address Translation (NAT)" function should be disabled or enabled. The active function supports the following protocols: TCP, UDP, and ICMP (only in passive mode).
- *Address Mapping Enabled*: Specify whether the "Address Mapping" function should be disabled or enabled.

QoS Parameters of Interface

- *Bandwidth of Connection (Kbps)*: Enter the required bandwidth of the connection in Kbps.
- *Bandwidth Control for Voice Connections*: Bandwidth control prevents the transmission rates available from being overbooked with voice connections within a multi-link connection. In other words, when header compression is active, a maximum of five voice connections (G.729/60 msec or G.723/60 msec) is permitted over a B channel. Select this check box if you want to activate the "Bandwidth Control for Voice Connections" function. This function only affects connections from one HG 1500 to another.
- *Bandwidth Used for Voice/Fax (%)*: Specify the percentage of available bandwidth that should be used for voice/fax connections (see also Section 9.3, "Quality of Service (QoS)").
- *QoS Capability*: Enter the "Quality of Service (QoS)" that is supported by the other party:
  - *Identical*: Both "DiffServ" and "IP Precedence" are accepted for the evaluation.
  - *DiffServ*: The connection partner prefers to work with the evaluation of the "Differentiate Services" 6-bit field (newer procedure).
  - *IP Precedence*: The connection partner prefers to work with the evaluation of the "IP Precedence" 3-bit field (older procedure).

Click *Apply*, then select *Next Page* to buffer your inputs and open the dialog for Codec Parameters.

5.1.2.3 Dialog for the operating mode: DSL Connection Type PPPoE

You can enter the same inputs as for DSL Connection Type PPTP (see Section 5.1.2.2, "Dialog for the operating mode: DSL Connection Type PPTP"), with the exception of the PPTP parameter.

Click *Apply*, then select *Next Page* to buffer your inputs and open the dialog for Codec Parameters.

5.1.3 Codec Parameters

Background information:

See Section 9.2, "Bandwidth Requirements in LAN/WAN Environments"

Codec table

In the "Codec" table you can edit the following parameters for the G.711-A-law, G.711-µ-law, G.723, G.729A, and G.729AB protocols:

- *Priority:* This field contains the priority for using the codec. The priority can be set from 1 (high) to 5 (low). Assign different priorities to the codecs. In the default configuration, G.711 A-law has priority 3, G.711 µ-law has priority 4, G.723 has priority 5, G.729A has priority 2, and G.729AB has priority 1.
- *Voice Activity Detection (VAD)* This field defines whether or not Voice Activity Detection (VAD) should be used for the relevant codec.
- *Frame Size*: You can set the sampling rate in this field. The adjustable values depend on the codecs.

T.38 Fax

- *T.38 Fax*: This field defines whether or not the T.38 Fax protocol is to be used.
- *Use FillBitRemoval*: This field defines whether or not fill bits should be deleted on sending and restored on receiving when using the T.38 Fax protocol. This makes it possible to save bandwidth.
- *Max. UDP Datagram Size for T.38 Fax (bytes)*: Enter the maximum size of a T.38 UDP datagram in bytes.
- *Error Correction Used for T.38 Fax (UDP)*: This field defines which method is to be used for error correction. The possible choices are "t38UDPRedundancy“ and "t38UDPFEC“, respectively.

> Codec G729 is identical to codec G729A, and codec G729B is identical to codec G729AB (no difference in terms of payload). Codecs G729 and G729B are therefore deactivated by default.
>
> From the perspective of H323 signaling, codecs G729 and G729A are different to codecs G729B and G729AB.
>
> Some non-HiPath H323 endpoints (Cisco GK) use the codec G729 or G729B for H323 signaling. In this case, the codecs G729 and G729B must also be used in the HG 1500 V8.
> Codecs G729 and G729B can remain inactive in a HiPath-only network.

Misc.

- *ClearChannel*: This field defines whether or not the ClearChannel function is to be enabled.
- *Frame Size*: You can set the sampling rate in this field. Possible settings are 10, 20, 30, 40, 50, and 60 milliseconds (msec). The default setting is 20 msec.
- Transmission of Fax/Modem Tones according to RFC2833:
  Events supported: 32 to 36 and 49. For a detailed description of the standard see http:///www.faqs.org/rfcs/rfc2833.html
- Transmission of Dtmf Tones according to RFC2833:
  Events supported: 0 to 15. For a detailed description of the standard see http:///www.faqs.org/rfcs/rfc2833.html
- Redundant Transmission of RFC2833 Tones according to RFC2198:
  All tones transmitted by RFC2833 are secured according to RFC2198, provided that RFC2198 is active.
  For a detailed description of the standard see http:///www.faqs.org/rfcs/rfc2833.html and http:///www.faqs.org/rfcs/rfc2198.html

Click *Apply* and then select *Next Page* to buffer your inputs and close the initial setup wizard. To save all inputs permanently, click the Save icon in the control area (see Section 3.2.2, "Icons in the WBM Window’s Control Area").

6 Maintenance

This module contains the functions necessary for the maintenance and administration of HG 1500.

WBM path:

WBM > *Maintenance*

The *Maintenance* module's options are displayed on the left.

Options in the Maintenance module:

> Configuration
> Software Image
> Firmware
> Multigateway Administration
> Job List
> Traces
> Events
> SNMP
> Admin Log
> Actions

6.1 Configuration

HG 1500 configuration data can be saved externally and reloaded. It is also possible to reset the configuration to the factory default.

WBM path:

WBM > Maintenance > *Configuration*

The *Configuration* tree structure is displayed.

Entries under *Configuration*:

> Configuration Data
> VPN/SSL Data

6.1.1 Configuration Data

You can back up and restore configuration data. You can also define what data should be saved or what data should be loaded.

The configuration data is saved as plain text and can be read or printed using any text editor.

> Always save the current configuration data before loading a new software image or other configuration data. If for some reason the newly-loaded configuration data or the new software image cannot be used, you can still revert to the previous configuration level.

Reset configuration:

Right-click *Configuration* to display the following entry:

> Reset Configuration to Factory Default

WBM path:

WBM > Maintenance > Configuration > *Configuration Data*

The *Configuration Data* tree structure is displayed.

Entries under *Configuration Data*:

> Load from Gateway
> Load to Gateway

If SSL is enabled (see also Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the following entry is also displayed as a folder:

> VPN/SSL Data

6.1.1.1 Load from Gateway

This function is used for creating backups. You can save the current HG 1500 configuration externally.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Configuration > (right-click) *Load from Gateway.*

Select *Load via HTTP* or *Load via TFTP* from the context menu. Using HTTP, you can save the data to the local file system. Using TFTP, you can load the data to a selected computer that has an ftp server.

> The *Load via TFTP* function is **not available** when SSL is activated (see Section 7.2.6, "SSL").

Depending on your selection, either the *Load Configuration from the Gateway via TFTP* mask or *Load Configuration from the Gateway via HTTP* mask is displayed.

You can edit the following fields:

- *TFTP Server***:** This field is only available if you select *Load via TFTP*. Enter the IP address of the server where the data should be saved. To save the data to this server, activate the radio button beside the input field.
- *Alternate TFTP Server:* This field is only available if you select *Load via TFTP*. Enter the IP address of an alternative server where the data should be saved. If the data should be saved to this server, activate the radio button beside the input field.
- *Remote File Name (PC File System)*: This field is only available if you select *Load via TFTP*. Enter the file name under which the data should be saved.
- *Specify Tables to Back Up*: Use the check boxes and radio buttons below to determine which data is to be saved. Choose *Select all tables* to select all tables. With *Deselect all tables* none of the tables are selected. You can also select or deselect the tables individually.

Once you have selected the data to be saved, click *Load*. An information window is displayed that you must confirm with *OK*.

6.1.1.2 Load to Gateway

This function is used for restoring data. You can load a HG 1500 configuration that is saved externally to the gateway.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Configuration > (right-click) *Load to Gateway*.

Select *Load via HTTP* or *Load via TFTP* from the context menu. Using HTTP you can load the data from the local file system to the Gateway. Using TFTP, you can load the data from a selected computer that has an ftp server.

> The *Load via TFTP* function is not availableSection 7.2.6, "SSL" when SSL is activated (see).

Depending on your selection, either the mask *Load Configuration to the Gateway via TFTP* or *Load Configuration to the Gateway via HTTP* is displayed.

You can edit the following fields:

- *TFTP Server*: This field is only available if you select *Load via TFTP*. Enter the IP address of the server where the backup file is saved. If the data should be loaded from this server, activate the radio button beside the input field.
- *Alternate TFTP Server*: This field is only available if you select Load via TFTP. Enter the IP address of an alternative server where the backup file is saved. If the data should be loaded from this server, activate the radio button beside the input field.
- *Remote File Name (PC File System)*: Enter the file name under which the data is saved.
- *Browse*: This button is only available if you select *Load via HTTP*. You can search the local file system for the backup file.

Then click *Load*. An information window is displayed that you must confirm with *OK*. The data is now loaded to the HG 1500 flash memory but it is not yet activated.

The mask *Do you want to activate the configuration now?* is now displayed.

Use the check boxes and radio buttons below to determine which data is to be loaded. Choose *Select all tables* to select all tables for activation. With *Deselect all tables* none of the tables are selected. You can also select or deselect the tables individually.

Finally, click *Activate Now*.

Click the Save icon in the control area and then - if necessary - perform a restart (note the Reset icon! See also Section 3.2.2, "Icons in the WBM Window’s Control Area").

> ℹ If you would prefer to activate the loaded configuration at a later date, click *Do Not Activate*. If you would prefer to activate the configuration data at a later date, click *Job List* in the Maintenance menu and activate the job (see Section 6.5, "Job List").

> ℹ LAN speed parameters are neither saved nor restored because each LAN section may have different LAN speed parameters in certain circumstances. If required, these parameters must be changed manually.

6.1.1.3 Reset Configuration to Factory Default

You can reset the gateway configuration to the factory defaults that were set when the system was delivered.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Configuration > (right-click) *Reset Configuration to Factory Default*

An important message is displayed that you should read. Finally, click *Reset to Factory Default*. Restart HG 1500 after this action. Click the Reset icon in the control area to do this (see Section 3.2.2, "Icons in the WBM Window's Control Area").

6.1.2 VPN/SSL Data

You can back up and restore VPN and SSL configuration data.

WBM path:

WBM > Maintenance > Configuration > *VPN/SSL Data*

Double click *VPN/SSL Data* to display the following sub-structure:

> Load from Gateway
> Load to Gateway

6.1.2.1 Load from Gateway

This is the backup function for VPN/SSL data. You can save the current VPN/SSL configuration of the HiPath HG 1500 to an external location.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Configuration > VPN/SSL Data (double-click) > (right-click) *Load from Gateway.*

Select *Load via HTTP* from the context menu. The *Load VPN/SSL Configuration from the Gateway via HTTP* mask is displayed.

You can edit the following fields:

- *Passphrase for encryption*: Select a passphrase for encrypting the backup data. You must reenter this passphrase when performing a restore operation.
- *Reenter Passphrase for encryption*: Reenter the passphrase for encryption a second time for security using the exact same spelling and syntax.

Once you have selected the data to be saved, click *Load*. If the Web browser prompts you to save the data in a file, follow the instructions in the browser dialog.

6.1.2.2 Load to Gateway

This is the restore function for VPN/SSL data. You can load a VPN/SSL configuration of the HiPath HG 1500 that is saved externally to the gateway.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Configuration > VPN/SSL Data (double-click) > (right-click) *Load to Gateway*.

Select *Load via HTTP* from the context menu. The *Load VPN/SSL Configuration to the Gateway via HTTP* mask is displayed.

You can edit the following fields:

- *Passphrase for decryption*: Enter the passphrase that was set when backing up the data.
- *Remote File Name (PC File System)*: Enter the file name under which the data is saved.

Once you have selected the data to be saved, click *Load*. An information window is displayed that you must confirm with *OK*. The data is now loaded to the HG 1500 flash memory, however it is not yet activated.

The mask *Do you want to activate the configuration now?* is displayed. Use the check boxes and radio buttons below to determine which data is to be loaded. Choose *Select all tables* to select all tables for activation. With *Deselect all tables* none of the tables are selected. You can also select or deselect the tables individually.

Finally, click *Activate Now*. The gateway performs a cold start.

> ⓘ If you would prefer to activate the loaded configuration at a later date, click *Do Not Activate*. If you would prefer to activate the configuration data at a later date, click *Job List* in the Maintenance menu and activate the job (see Section 6.5, "Job List").

6.2 Software Image

The HiPath HG 1500 software image can be updated from an external source.

WBM path:

WBM > Maintenance > *Software Image*

The tree structure for *Software Image* is displayed.

Entries under *Software Image*:

> Software Image

6.2.1 Software Image

The software image in the HiPath HG 1500 flash memory can be updated from an external source.

ℹ Always save the current configuration data (see Section 6.1.1.1, "Load from Gateway") before loading a new software image or other configuration data. If for some reason the newly-loaded configuration data or the new software image cannot be used, you can still revert to the previous configuration level.

WBM path:

WBM > Maintenance > Software Image > *Software Image*

The tree structure for *Software Image* is displayed.

Entries under *Software Image*:

> Load to Gateway

6.2.1.1 Load to Gateway

This function allows you to load a new software image to the HiPath HG 1500 system.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Software Image > (right-click) *Load to Gateway.*

Select *Load via HTTP* or *Load via TFTP* from the context menu. Using HTTP, you can load the software image from the local file system to the Gateway. Using TFTP, you can load the software image from a selected computer that has an ftp server.

> The *Load via TFTP* function is not available with an activated SSL (see Section 7.2.6, "SSL").

Depending on your selection, either the mask *Load Software Image to the Gateway via TFTP* or *Load Software Image to the Gateway via HTTP* is displayed.

You can edit the following fields:

- *TFTP Server*: This field is only available if you select Load via TFTP. Enter the IP address of the server where the software image is saved. If the data should be loaded from this server, activate the radio button beside the input field.
- *Alternate TFTP Server*: This field is only available if you select *Load via TFTP*. Enter the IP address of an alternative server where the software image is saved. If the data should be loaded from this server, activate the radio button beside the input field.
- *Remote File Name (PC File System)*: Enter the file name under which the software image is saved.
- *Browse*: This button is only available if you select *Load via HTTP*. You can search the local file system for the software image.

Then click *Load*. An information window is displayed that you must confirm with *OK*.

The mask *Do you want to activate the loaded software image now?* appears in which you can chose whether the software should be activated immediately or later.

Click *Activate Now* to activate the software image immediately. The gateway performs a cold start to load the new software to the RAM.
Click *Do Not Activate* to activate the software image at a later date. You can then activate the loaded software image at a later date (see Section 6.10.2.2, "Software Activation").
Click *Schedule Activation ...* to specify when the software image should be activated.

After you click *Schedule Activation ...*, the *Edit Automatic Action* mask is displayed. Edit the following entries:

- *Start Action in:* The time in days, hours and minutes until the action is started.
- *Start Action on:* The date and time when the action should begin.

Click *Use Calendar* to select the date from a calendar. The display now includes a calender. You can scroll between years and months with the arrow keys. Click the required day to copy the date to the start field.

Click *Apply* followed by *OK* in the confirmation mask.

6.3 Firmware

The HiPath HG 1500 firmware can be updated.

WBM path:

WBM > Maintenance > *Firmware*

The *Firmware* tree structure is displayed.

Entries under *Firmware*:

> Firmware

6.3.1 Firmware

The HiPath HG 1500 firmware can be updated.

WBM path:

WBM > Maintenance > Firmware > *Firmware*

The *Firmware* tree structure is displayed.

Entries under *Firmware*:

> Load to Gateway

6.3.1.1 Load to Gateway

This function is used for loading a new firmware to the HiPath HG 1500 system. The new firmware file must be located on the local file system.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Firmware > (right-click) *Load to Gateway.*

Select *Load via HTTP* from the context menu. The mask *Load Firmware to the Gateway via HTTP* is displayed.

You can edit the following fields:

- *Remote File Name (PC File System)*: Enter the file name under which the firmware is saved.

- *Browse*: You can search the local file system for the firmware file.

Then click *Load*. An information window is displayed that you must confirm with *OK*.

The mask *Do you want to upgrade to the loaded firmware now?* appears in which you can choose whether the firmware should be activated immediately or later.

Click *Activate Now* to activate the firmware immediately. The gateway performs a cold start to load the new firmware.
Click *Do Not Activate* to activate the firmware later. You can then activate the loaded firmware at a later date (see Section 6.10.2.2, "Software Activation").
Click *Schedule Activation ...* to specify when the firmware should be activated.

After you click *Schedule Activation ...*, the *Edit Automatic Action* mask is displayed. Edit the following entries:

- *Start Action in:* The time in days, hours and minutes until the action is started.
- *Start Action on:* The date and time when the action should begin.

Click *Use Calendar* to select the date from a calendar. The display now includes a calender. You can scroll between years and months with the arrow keys. Click the required day to copy the date to the start field.

Click *Apply* followed by *OK* in the confirmation mask.

6.4 Multigateway Administration

You can distribute (copy) selected HiPath HG 1500 configuration data that is currently administered via WBM to other selected HiPath HG 1500 systems. If several HiPath HG 1500 are implemented, multigateway administration helps you to standardize your configurations, thus minimizing fault potential.

WBM path:

WBM > Maintenance > *Multigateway Admin.*

The *Multigateway Administration* tree structure is displayed.

Entries under *Multigateway Administration*:

> List of Gateways
> List of Configuration Tables
> Distribution
> Job List

We recommend editing the entries in sequence, i.e. you should first create the list of gateways to which the configuration data should be copied. Then select the configuration data to be copied using the list of configuration tables. Finally, start the distribution routine and check the status of the activated jobs using the job list.

6.4.1 List of Gateways

You can specify whether the configuration data of the gateway currently being administered can be distributed (copied) to all gateways. Entries are added to the list when you add each gateway separately (see Section 6.4.1.7, "Add Gateway").

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) *List of Gateways*

The *List of Gateways* menu is displayed. It contains the following entries:

> Display All Gateways
> Display Selected Gateways
> Display Unselected Gateways
> Select All Gateways for Distribution
> Deselect All Gateways for Distribution
> Display All Gateways with Status Information
> Add Gateway
> Delete All Gateways

List of Gateways (folder):

If the *List of Gateways* contains entries, it is represented by a folder icon. In this case, double-click *List of Gateways* in the tree structure to view the individual gateways in the list. Gateways with a green bullet point are selected for configuration distribution, those with a red bullet point are not selected. Right-click an individual gateway to display a menu containing the following entries:

> Deselect Gateway for Distribution / > Select Gateway for Distribution
> Display Gateway Properties
> Display Gateway Status Information
> Edit Gateway Properties
> Delete Gateway

6.4.1.1 Display All Gateways

You can display all HiPath HG 1500 systems contained in the list of gateways.

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Display All Gateways*

A table containing all gateways is displayed. The name and IP address of each gateway is displayed. Details as to whether the gateway is selected for configuration distribution are also provided for each gateway (see Section 6.4.1.13, "Edit Gateway Properties", Section 6.4.1.14, "Delete Gateway", Section 6.4.1.4, "Select All Gateways for Distribution" and Section 6.4.1.5, "Deselect All Gateways for Distribution").

6.4.1.2 Display Selected Gateways

Using the list of gateways, you can also display the HiPath HG 1500 systems that have been selected for configuration distribution (see Section 6.4.1.13, "Edit Gateway Properties", Section 6.4.1.14, "Delete Gateway", Section 6.4.1.4, "Select All Gateways for Distribution" and Section 6.4.1.5, "Deselect All Gateways for Distribution").

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Display Selected Gateways*

A table is displayed containing all gateways selected for configuration distribution. The name and IP address of each gateway is displayed.

6.4.1.3 Display Unselected Gateways

Using the list of gateways, you can also display the HiPath HG 1500 systems that have **not** been selected for configuration distribution (see Section 6.4.1.13, "Edit Gateway Properties", Section 6.4.1.14, "Delete Gateway", Section 6.4.1.4, "Select All Gateways for Distribution" and Section 6.4.1.5, "Deselect All Gateways for Distribution").

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Display Unselected Gateways*

A table containing all gateways that have not been selected is displayed. The name and IP address of each gateway is displayed.

6.4.1.4 Select All Gateways for Distribution

You can select all HiPath HG 1500 systems in the list of gateways for configuration distribution.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Select All Gateways for Distribution*

All gateways in the list are selected for configuration distribution.

6.4.1.5 Deselect All Gateways for Distribution

You can remove all HiPath HG 1500 systems from the list of gateways for configuration distribution.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Deselect All Gateways for Distribution*

All gateways in the list are removed from configuration distribution.

6.4.1.6 Display All Gateways with Status Information

You can display all the HiPath HG 1500 systems in the list of gateways, and show for each gateway the defined gateway properties and the current gateway status.

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Display All Gateways with Status Information*

An information window is displayed that you must confirm with *OK*.

A table containing all gateways is displayed. The name and IP address of each gateway is displayed. Details as to whether the gateway is selected for configuration distribution are also provided for each gateway (see Section 6.4.1.13, "Edit Gateway Properties", Section 6.4.1.14, "Delete Gateway", Section 6.4.1.4, "Select All Gateways for Distribution" and Section 6.4.1.5, "Deselect All Gateways for Distribution").

As well as this static information, the following status information is also displayed for each gateway:

- *Connection Status*: Indicates whether the gateway is available.
- *SSL Enabled*: Indicates whether an SSL (Secure Socket Layer) is activated on the gateway.
- *Gateway Location*: Specifies the location of the gateway in the network.
- *Gateway Uptime*: Indicates how much time has passed since the gateway was last started.
- *Gateway Version*: Specifies the hardware version of the gateway.

6.4.1.7 Add Gateway

To add entries to the list of gateways, you must use this function to add each gateway individually.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Add Gateway*

The *Add Gateway Properties* mask is displayed.

You can edit the following fields:

- *Gateway Name*: The name used to identify the gateway in the list of gateways. Enter a character string in this field.
- *Gateway IP Address*: Enter the IP address of the gateway in the form `num.num.num.num`. In each case, `num` represents a number between 0 and 255.
- *Select Gateway for Distribution*: Specify whether the gateway should be used for configuration distribution.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.4.1.8 Delete All Gateways

You can delete the entire list of gateways.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (right-click) List of Gateways > *Delete All Gateways*

An important warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.4.1.9 Deselect Gateway for Distribution

You can remove an individual HiPath HG 1500 system from the configuration distribution. This is only possible if the list of gateways contains entries (see Section 6.4.1.7, "Add Gateway"), and if the selected gateway is selected for configuration distribution (green bullet point).

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (double-click) List of Gateways > (right-click) [selected gateway] > *Deselect Gateway for Distribution*

The gateway is removed from configuration distribution (save the new configuration status with the Save icon in the control area).

6.4.1.10 Select Gateway for Distribution

You can select an individual HiPath HG 1500 system for configuration distribution. This is only possible if the list of gateways contains entries (see Section 6.4.1.7, "Add Gateway"), and if the selected gateway is not yet selected for configuration distribution (red bullet point).

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (double-click) List of Gateways > (right-click) [selected gateway] > *Select Gateway for Distribution*

The gateway is selected for configuration distribution (save the new configuration status with the Save icon in the control area).

6.4.1.11 Display Gateway Properties

You can display the data of an individual HiPath HG 1500 system contained in the list of gateways. This is only possible if the list of gateways contains entries (see Section 6.4.1.7, "Add Gateway").

WBM path:

WBM > Maintenance > Multigateway Administration > (double-click) List of Gateways > (right-click) [selected gateway] > *Display Gateway Properties*

The *Gateway Properties* mask is displayed. For descriptions of the individual fields, see Section 6.4.1.7, "Add Gateway".

6.4.1.12 Display Gateway Status Information

You can display the statistical data and current status information for an individual HiPath HG 1500 system contained in the list of gateways. This is only possible if the list of gateways contains entries (see Section 6.4.1.7, "Add Gateway").

WBM path:

WBM > Maintenance > Multigateway Administration > (double-click) List of Gateways > (right-click) [selected gateway] > *Display Gateway Status Information*

The *Gateway Status Information* mask is displayed. Descriptions of the fields containing the static gateway properties are provided in Section 6.4.1.7, "Add Gateway". Descriptions of the fields containing the status information are provided in Section 6.4.1.6, "Display All Gateways with Status Information".

6.4.1.13 Edit Gateway Properties

You can modify the data of an individual HiPath HG 1500 system contained in the list of gateways. This is only possible if the list of gateways contains entries (see Section 6.4.1.7, "Add Gateway").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (double-click) List of Gateways > (right-click) [selected gateway] > *Edit Gateway Properties*

The *Gateway Properties* mask is displayed. For descriptions of the individual fields, see Section 6.4.1.7, "Add Gateway".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.4.1.14 Delete Gateway

You can delete an individual HiPath HG 1500 system from the list of gateways. This is only possible if the list of gateways contains entries (see Section 6.4.1.7, "Add Gateway").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (double-click) List of Gateways > (right-click) [selected gateway] > *Delete Gateway*

An important warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.4.2 List of Configuration Tables

You can view and define the configuration data that should be transferred to other gateways from the gateway that is currently administered via WBM. The selected configuration data is transferred via the gateways that are selected for distribution in the List of Gateways. The actual distribution is started via the function *Distribute Configuration* (see Section 6.4.3.1, "Distribute Configuration").

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) *List of Configuration Tables*

Right-click *List of Configuration Tables* to display a menu containing the following entries:

> Display List of Configuration Tables
> Edit List of Configuration Tables

6.4.2.1 Display List of Configuration Tables

In the case of configuration distribution, you can display the configuration data to be transferred to other gateways from the gateway that is currently administered via WBM.

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) List of Configuration Tables > *Display List of Configuration Tables*

The *List of Configuration Tables for Distribution* mask is displayed. When distribution is activated (see Section 6.4.3.1, "Distribute Configuration"), the selected configuration data will be copied to the gateways selected for distribution.

6.4.2.2 Edit List of Configuration Tables

In the case of configuration distribution, you can display the configuration data to be transferred to other gateways from the gateway that is currently administered via WBM.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (right-click) List of Configuration Tables > *Display List of Configuration Tables*

The *List of Configuration Tables for Distribution* mask is displayed. When distribution is activated (see Section 6.4.3.1, "Distribute Configuration"), the selected configuration data will be copied to the gateways selected for distribution.

Use the check boxes and radio buttons to determine which data is to be loaded. Choose *Select all tables* to select all tables for distribution. With *Deselect all tables* none of the tables are selected. You can also select or deselect the tables individually.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.4.3 Distribution

You can start distribution of the configuration. The List of Gateways and List of Configuration Tables must be prepared appropriately first.

WBM path:

WBM > Maintenance > Multigateway Administration > *Distribution*

Right-click *Distribution* to display a menu containing the following entries:

> Distribute Configuration

6.4.3.1 Distribute Configuration

This function is used to distribute the configuration. In other words, the selected configuration data (see Section 6.4.2.2, "Edit List of Configuration Tables") is transferred from the gateway that is currently administered via WBM to all gateways selected for distribution in the list of gateways (see Section 6.4.1, "List of Gateways"). You should only start configuration distribution when the configuration tables and the list of gateways have been appropriately prepared.

> ⓘ Always save the current configuration data to the relevant gateways (see Section 6.1.1, "Configuration Data") before loading other configuration data via configuration distribution. If for some reason the newly-loaded configuration data cannot be used, you still have the previous configuration status as a backup.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Multigateway Administration > (right-click) Distribution > *Distribute Configuration*

An important warning is displayed. Click *Distribute***,** and in both confirmation masks that follow, *OK*. The distribution job is started. So that you can check the job status, the job list is displayed (see Section 6.4.4, "Job List").

6.4.4 Job List

As well as other information, the job list also includes details as to when distribution jobs were started with the function Distribute Configuration. You can monitor and cancel distribution jobs.

WBM path:

WBM > Maintenance > Multigateway Administration > *Job List*

Right-click *Job List* to display a menu containing the following entries:

> Display List of Jobs

6.4.4.1 Display List of Jobs

You can view the configuration distribution jobs that are currently being processed. The list of jobs contains details as to when distribution jobs were started with the function Distribute Configuration.

WBM path:

WBM > Maintenance > Multigateway Administration > (right-click) Job List > *Display List of Jobs*

The list of jobs is displayed. The list contains the following columns:

- *Type*: This column shows the task of each job and how it was started.
- *ID*: The column shows the unique job number in each case.
- *Duration*: This column shows how many seconds have passed since the job was started.
- *State*: This column indicates whether jobs are still in progress or already completed.
- *Action*: You can cancel the corresponding job by clicking *Abort and Delete Job*.

The following buttons are also provided:

- *Refresh*: The displayed job list is reloaded and shows the current data.
- *Delete All Jobs*: All jobs in the list are deleted. An information window must be confirmed with *OK*.

- *Activate All*: All jobs are activated on the gateways.
- *Save All*: All jobs are stored on the gateways.

6.5 Job List

The Job List contains entries for current data transfers, for example when distribution jobs were started with the function Distribute Configuration.

WBM path:

WBM > Maintenance > *Job List*

The list of jobs is displayed. The list contains the following columns:

- *Type*: This column shows the task of each job and how it was started.
- *ID*: The column shows the unique job number in each case.
- *Duration*: This column shows how many seconds have passed since the job was started.
- *State*: This column indicates whether jobs are still in progress or already completed.
- *Action*: You can cancel the corresponding job by clicking *Abort and Delete Job*.

The following buttons are also provided:

- *Refresh*: The displayed job list is reloaded and shows the current data.
- *Delete All Jobs*: All jobs in the list are deleted. An information window must be confirmed with *OK*.
- *Activate All*: Can only be used if there are jobs for the "Multigateway Administration" feature.
- *Save All*: Can only be used if there are jobs for the "Multigateway Administration" feature.

6.6 Traces

A trace logs the execution of a software component. A technician can use these traces to determine the cause of an error.

For further information on traces, see Section 9.9.2, "Traces".

> Activating traces can have a negative impact on system performance.
> If the load is particularly heavy, the board may not be able to process all trace information. For further information on this, see Section 6.6.2.3, "Board Overload Caused by Trace Information".
> When a trace file reaches its maximum size, the file is closed and stored as "trace.bak" in the same directory. A new (empty) "trace.txt" file is created at the same time.

WBM path:

WBM > Maintenance > *Traces*

The *Traces* tree structure is displayed.

Entries under *Traces*:

> Trace Format Configuration
> Trace Output Interfaces
> Trace Log
> Customer Trace Log
> Trace Encryption
> Trace Profiles
> Trace Components

With the trace configuration you can define whether traces should be logged and how this should be performed. If the traces on the gateway are logged in a file, you can save and delete the trace log for this file. Using trace profiles and trace components, you can configure the traces to be logged, and the detail in which this information should be provided.

6.6.1 Trace Format Configuration

You can check/define which header data is contained in the trace and how the trace data is to be edited for the output format.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) *Trace Format Configuration*

Right-click *Trace Format Configuration* to display a menu containing the following entries:

> Display Trace Configuration
> Edit Trace Configuration

6.6.1.1 Display Trace Configuration

WBM path:

WBM > Maintenance > Traces > (right-click) *Trace Format Configuration* > *Display Trace Configuration*

The trace format configuration is displayed. For descriptions of the individual fields, see Section Edit Trace Configuration.

6.6.1.2 Edit Trace Configuration

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) *Trace Format Configuration* > *Edit Trace Configuration*

The Trace Format Configuration mask is displayed.

Header data included in the trace output

- **Global Trace Header Format Settings**:
  Activate this function to globally specify (for all selected trace components) which data should be contained in the trace header. If this setting is activated, the corresponding setting is deactivated for the individual components.

  Once activated, the following header data is available for selection:

  – Subsystem ID

  – Task Name

  – Task ID

  - Time
  - Module Name
  - Line Number

Formatting trace data

- **Full formatting with Parameter Expansion (default)**:
  This is the default output mode. All data types are expanded. Trace output: normal. Suitable for normal mode.
- **Limited Formatting (Message types only in Hex)**:
  Message types are only output in hex format in this restricted mode. Trace output: fast. Suitable for medium load.
- **Limited Formatting (Message types binary, special X-Tracer format)**:
  In this restricted output mode, data types are output in binary format. In other words, in the same format as when the trace was performed. The binary format is intended to be used for analysis with the X-Tracer tool. Trace output: fast. Suitable for medium to high load.
- **Limited Formatting (only expansion of basic data types)**:
  Only elementary data types are expanded in this restricted output mode (integer, short, long, string, for instance). Trace output: very fast. Suitable for high load.
- **Performance optimized Trace without Parameter Expansion**:
  Data types are not expanded in this output mode. This means that no expenditure is required for formatting trace data. Trace output: extremely fast. Suitable for very high load.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.2 Trace Output Interfaces

You can use this function to review or specify the interface that outputs trace data.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) *Trace Output Interfaces*

Right-click *Trace Output Interfaces* to display a menu containing the following entries:

> Display Trace Output Interfaces
> Edit Trace Output Interfaces

6.6.2.1 Display Trace Output Interfaces

WBM path:

WBM > Maintenance > Traces > (right-click) *Trace Output Interfaces* > *Display Trace Output Interfaces*

The trace output interfaces are displayed: For descriptions of the individual fields, see Section Edit Trace Output Interfaces.

6.6.2.2 Edit Trace Output Interfaces

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) *Trace Output Interfaces* > *Edit Trace Output Interfaces*

The *Trace Output Interfaces* mask is displayed. You can edit the following fields:

Console Trace

- **Switch Synchron Console Trace On**:
  If this option is enabled, trace messages are not buffered. This means that any invoked trace messages are immediately output to the console. This type of trace slows the software and should only be used for diagnostic purposes. It is particularly suitable for performing traces for system crashes. If this option is enabled, all other trace interfaces are deactivated.
- **Switch Console Trace On**:
  Activate this option to output the trace data to the console at the V.24 connector.

File Trace

- **Switch File Trace On**:
  Activate this option to write the trace data to a log file.

Trace via LAN

- **Switch Trace via LAN On**:
  Activate this option to transfer the trace data via the LAN interface.

> ⚠ **Caution**
> All other trace interfaces are automatically deactivated if the trace is output via the service center.

The following fields provide additional information:

- *Maximum Trace Buffer Size (byte)*: The amount of log data saved to the buffer memory if *Switch File Trace On* is activated.
- *Maximum Trace File Size (byte)*: The maximum size of the log file if *Switch File Trace On* is activated.
- *Trace Timer (sec)*: The interval in seconds until data is written to the trace file if *Switch File Trace On* is activated.
- *Timer Value (sec)*: The interval in seconds until data is transferred if the *Switch Trace via LAN On* option is active.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.2.3 Board Overload Caused by Trace Information

If the load is particularly heavy, the volume of trace information may be so great that the board is unable to process it. Console overload is indicated by the message `OAM Msg Queue [...] full. Remove Messages`. If this happens, carry out the following steps:

1. Deactivate the option *Switch Console Trace On*.
   If the console remains overloaded:
2. Deactivate the option *Switch File Trace On*.
   If the console still remains overloaded:
3. Activate the option *Switch Trace via LAN On*. Using a trace tool, the trace data is processed via the connected LAN instead of via the board.

If the overload conditions continues even though the console trace has been disabled, the event logs will also be included in the event log file on the board. The board can retrieve and display the event log file. This allows you to determine whether the console is still overloaded.

6.6.3 Trace Log

If file trace is activated, (see also Section 6.6.2.3, "Board Overload Caused by Trace Information"), you can load the log file from the gateway to the Administration PC or to another computer. You can also delete the log file.

WBM path:

WBM > Maintenance > Traces > *Trace Log*

Right-click *Trace Log* to display a menu containing the following entries:

> Load via TFTP
> Load via HTTP
> Expert Mode
> Clear Trace Log

6.6.3.1 Load via TFTP

You can load the trace log file from HG 1500 to a computer that has an ftp server.

> The *Load via TFTP* function is not available with an activated SSL (see Section 7.2.6, "SSL").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Log > *Load via TFTP*

The *Load Trace Log from the Gateway via TFTP* mask is displayed. You can edit the following fields:

- *TFTP Server*:Enter the IP address of the server where the trace log file should be saved. To save the data to this server, activate the radio button beside the input field.

- *Alternate TFTP Server*:Enter the IP address of an alternative server where the trace log file should be saved. If the data should be saved to this server, activate the radio button beside the input field.

> The gateway automatically enters the IP addresses last entered for the default and alternative TFTP servers. You only need to edit these addresses if they have been changed.

- *Remote File Name (PC File System)*: Enter the file name under which the trace log file should be saved.

Click *Load* followed by *OK* in the confirmation mask.

6.6.3.2 Load via HTTP

You can transfer the trace log file from HG 1500 to the computer used to administer the gateway.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Log > *Load via HTTP*

Once the file has been transferred it will be shown immediately in the system editor.

6.6.3.3 Expert Mode

You can view the size of trace sub-files in the trace directory and load them individually where necessary.

6.6.3.4 Clear Trace Log

The log file can be deleted from the gateway flash memory. This is useful if you have performed Load via TFTP or Load via HTTP.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Log > *Clear Trace Log*

An important warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.4 Customer Trace Log

The HG 1500 customer trace log can be displayed, loaded to the administration PC via HTTP and deleted from the gateway flash memory.

WBM path:

WBM > Maintenance > Traces > *Customer Trace Log*

Right-click *Customer Trace Log* to display a menu containing the following entries:

> Display
> Load via HTTP
> Clear Trace Log

6.6.4.1 Display

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Customer Trace Log > *Display*

The following data is displayed:

- Registration status: SIP provider, SIP user name, SIP binding
- SIP error: SIP provider, SIP user name
- Unknown
- no link on the WAN interface
- Connection state
- wrong user
- wrong password
- PPP authentication rejected
- dynamic IP address
- Connection
- Registration status
- Error message
- duplicated IP address detected
- duplicated MAC address detected

- Login error: wrong user name
- Login error: wrong password
- SIP error
- Incoming call: from x to y
- Incoming call (ISDN): from x to y was ignored since number not configured (PTM)
- Incoming call: from x to y was rejected, since station offline
- Outgoing call: from x to y
- EMERGENCY CALL from x to y
- Outgoing call: from x to y, number must be dialed via ISDN
- Outgoing call: from x to y, fax machine cannot make calls via VoIP => go via ISDN
- Outgoing call: from x to y, no VoIP provider online => go via ISDN
- Rejected call: from x to y, number invalid
- Rejected outgoing call: from x to y, entrance telephone
- Rejected outgoing call: from x to y, unknown telephone
- Rejected outgoing call: from x to y, wrong authorization
- Rejected outgoing call: from x to y, no VOIP provider online
- New subscriber/telephone with number x
- subscriber/telephone with number x was deleted
- subscriber/telephone with number x now has y

STUN messages:

- STUN: Determine router NAT-TTL: x seconds
- STUN: Determined connection type into the Internet: x
- STUN: STUN is enabled for provider calls
- STUN: STUN is deactivated for provider calls
- STUN: STUN was deactivated in the configuration
- STUN: STUN was enabled in the configuration (mode "Always"). Use STUN for each connection setup to an Internet telephony service provider
- STUN: Change of the external IP determined (from a:x to b:y)

- STUN: STUN mode was set to "AUTOMATIC". A check is made as to whether STUN is needed for connections with Internet telephony service providers.
- STUN: Symmetric NAT identified. STUN is enabled, since this is forced by the "ALWAYS" mode. If you or your Internet telephony service provider are using an ALG or SBC, this may possibly be disturbed by STUN. In this scenario please deactivate STUN ("OFF" or "AUTO").
- STUN: Symmetric NAT identified. STUN is deactivated, since it will probably be of no further help. To force the use of STUN please set the STUN mode to "ALWAYS".

LDAP messages:

- LDAP server busy
- LDAP server not reachable
- LDAP server result code

The HG 1500 customer trace log is displayed. If specified, the display is updated every ten seconds.

6.6.4.2 Load via HTTP

You can transfer the log file from HG 3550HG 1500 to the processor via which you administer the gateway.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Customer Trace Log > *Load via HTTP*

A log file that can be opened with an editor is stored on your computer.

6.6.4.3 Clear Trace Log

The log file can be deleted from the gateway flash memory. This is useful if you previously performed Load via HTTP.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Customer Trace Log > *Clear Trace Log*

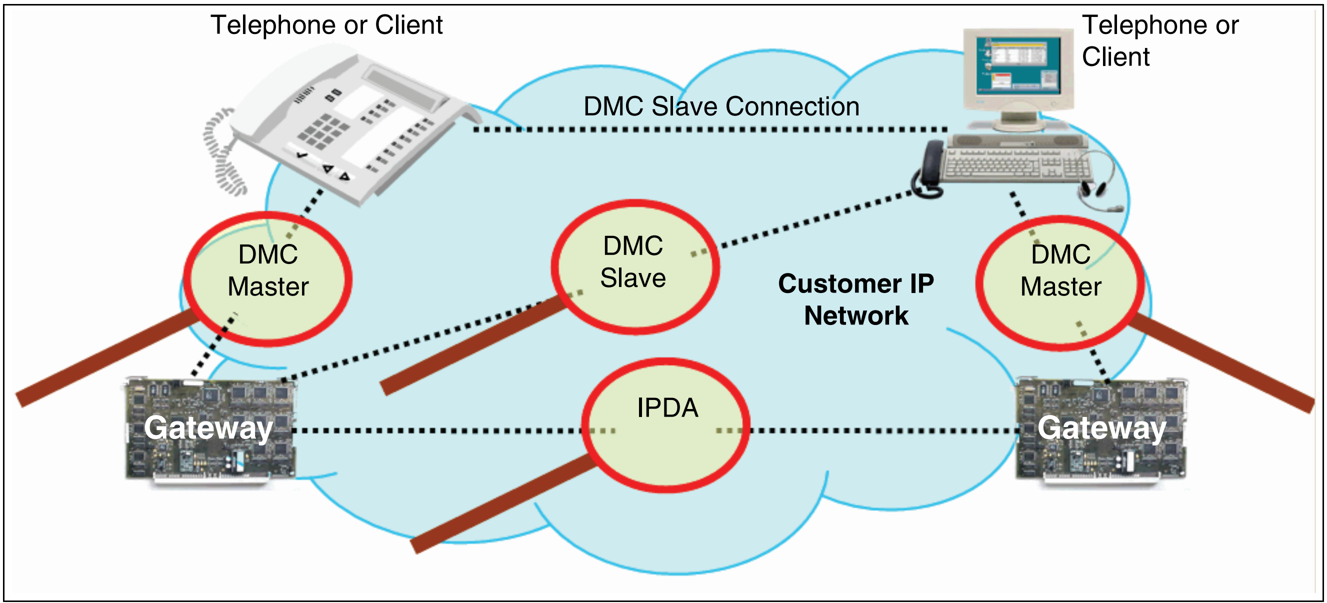
An important warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.5 Trace Encryption

What is a Secure Trace?

A secure trace is used to detect failures in the HiPath system. Recordings are made by the secure trace about encrypted VoIP payload and signaling data flows to and from the gateway.

> In this documentation a gateway refers to a HG 1500 gateway on HiPath 3000.



A secure trace can be recorded for the following connections:

- DMC Master connections (gateway <-> client/telephone)
- DMC slave connections (gateway <-> client/telephone)
- Standard SIP connections (gateway <-> client/telephone)
- CorNet-IP NQ networking (gateway <-> gateway)
- SIP-Q networking (gateway <-> gateway)
- IPDA connectivity (SL200 <-> gateway)

The secure trace contains encrypted information. This information can be decrypted by the developer with an appropriate key.

Secure trace procedure:

The procedure for creating a secure trace is as follows:

1. The service technician detects a problem in the network. The technician discusses the need for a secure trace with the developer.
2. The customer is informed of this need and must confirm receipt of notification. The customer then issues a secure-trace request specifying when monitoring should start and end (with date and time).
3. The developer generates a key pair consisting of the public key and the private key. This key pair can only be used for one secure trace. The certificates are used as follows:
   - The certificate with the private key is strictly confidential and can only be used by authorized developers.
   - The certificate with the public key is transferred to the service technician. The service technician then imports the certificate into WBM (see Import X.509 File for Secure Trace).
4. The service technician informs the customer about the start of trace activities. The customer must notify the relevant users.

> ⚠ **Warning**
> The recording of calls and connection data constitutes an offence if the relevant parties are not forewarned.

5. The service technician provides the gateways for which a secure trace is to be created with the certificate.
6. The customer activates the Secure Trace function. A secure trace is generated. The activation and subsequent deactivation activities are logged by the relevant HiPath systems.
7. Once the secure trace has been generated, the customer is informed about the end of trace activities. The service technician removes the certificate from the system.
8. The secure trace is forwarded to the developer.
9. The developer decrypts the secure trace using the private key. He or she then analyzes the decrypted recordings.
10. All relevant material and data must be safely destroyed once analysis is complete. The private key must also be destroyed to prevent decryption of any illegal copies of the secure trace.

6.6.5.1 Import X.509 File for Secure Trace

Certificate:

This certificate is needed to generate a secure trace and is provided by the developer. It contains the public key and must be provided in PEM or binary format. The certificate is valid for up to one month.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > Trace Encryption > (right-click) *Import X.509 File for Secure Trace*

Procedure:

Proceed as follows to import the certificate:

1. Select: WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > Trace Encryption > (right-click) *Import X.509 File for Secure Trace*). The *Load the Secure Trace Certificate via HTTP* mask is displayed.
2. Click *Browse* to select a file containing the certificate and confirm with *Open*. The file is loaded.
3. Click *Load*.
4. Click the Save icon in the control area to save your changes.

You can now generate the secure trace.

6.6.5.2 Secure Trace Settings

This entry allows you to display and edit the gateway properties and settings.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > Trace Encryption > *Secure Trace Options*

Right-click *Secure Trace Options* to display a menu with the following entries:

> Secure Trace State
> Start Secure Trace
> Stop Secure Trace

Secure Trace State

This mask indicates if a secure trace is currently active.

WBM path:

WBM > Maintenance > Traces > Trace Encryption > (right-click) Secure Trace Settings > *Secure Trace State*

The *SecureTrace State* mask is displayed with the following data:

- *SecureTrace is active*: This field shows if a secure trace is currently underway.
- *Automatic Deactivation Time*: This field shows when the secure trace is scheduled to finish and when the secure trace function will automatically deactivate.
- *SecureTrace for these protocols*: This field shows the protocols for which the secure trace is generated. The options are: TC (TLS), H.323 Core/HSA (TLS), MMX (PEP), SIP Core/ SSA (TLS), MSC (SRTP)

Start Secure Trace

Prerequisites:

You can only start the secure trace if the following prerequisites have been satisfied:

- Secure trace is not yet active.
- The customer requested a secure trace and would like to enter his or her *SecureTrace Activation Password* in WBM (a password can consist of multiple words and contain up to 20 characters).
- You received a public key from the developer and imported it into WBM.

WBM path:

WBM > Maintenance > Traces > Trace Encryption > (right-click) Secure Trace Settings > *Start Secure Trace*

Procedure:

Proceed as follows to start the secure trace:

1. Select: WBM > Maintenance > Traces > Trace Encryption > (right-click) Secure Trace Settings > *Start Secure Trace.* The *Start SecureTrace* mask is displayed.
2. Enter the following data in the "Start Parameters" area:
   - *SecureTrace Activation Password*: To restrict the use of the Secure Trace function, activation is protected by a special password known only to the customer. This password is therefore the customer's key and the certificate is the service technician's key. Both keys are needed to start the secure trace
   - *Duration of SecureTrace (s)*: This is a mandatory entry.
3. Set the protocols for which the secure trace is to be created: All protocols in the "SecureTrace protocols" area are activated by default. Deactivate the protocols for which a secure trace should not be generated:
   - TC (TLS)
   - H.323 Core/HSA (TLS)
   - MMX (PEP)
   - SIP Core/SSA (TLS)
   - MSC (SRTP)
4. Click *Start SecureTrace*. The secure trace is generated.

Stop Secure Trace

WBM path:

WBM > Maintenance > Traces > Trace Encryption > (right-click) Secure Trace Settings > *Stop Secure Trace*

Procedure:

Click *Stop SecureTrace* in the "Stop SecureTrace" mask.

6.6.5.3 Edit Secure Trace Passphrase

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > Trace Encryption > (right-click) *Edit Secure Trace Passphrase*

Procedure:

Proceed as follows to edit the passphrase:

1. Select: WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > Trace Encryption > (right-click) *Edit Secure Trace Passphrase*. The *Edit Secure Trace Passphrase* mask is displayed.
2. Complete the input fields *Current Password*, *New Password*, and *Confirm New Password*.
3. Click *Apply*.
4. Click the Save icon in the control area to save your changes.

6.6.6 Trace Profiles

Trace profiles define the data to be logged and the detail in which this information should provided. Trace components (see Section 6.6.7, "Trace Components") are assigned to a trace profile. This allows you to specify the gateway components for which a trace profile process and status information should be logged. The detail provided in the logs can be set using trace levels.

You can create, modify and delete user-defined trace profiles. Predefined trace profiles are also provided. You can stop all trace profiles at once, or start and stop them individually. When you start a trace profile, logging is activated for this profile. When you stop the profile, logging is deactivated.

See also: Section B.1.3, "Overview: Trace Profiles".

WBM path:

WBM > Maintenance > Traces > *Trace Profiles*

Right-click *Trace Profiles* to display a menu containing the following entries:

> Display All Trace Profiles
> Add Trace Profile (Empty Profile)
> Add Trace Profile (with Current Trace Settings)
> Stop All Trace Profiles

Trace Profiles (folder):

Double-clicking *Trace Profiles* opens a tree structure where you can view the individual trace profiles. Trace profiles with a green bullet point have been started, those with a red bullet point have been stopped. Right-click an individual gateway to display a menu containing the following entries:

> Display Trace Profile
> Start Trace Profile / > Stop Trace Profile

In the case of user-defined trace profiles, the following entries are also displayed:

> Edit Trace Profile
> Delete Trace Profile

6.6.6.1 Display All Trace Profiles

You can view a list of all predefined and user-defined trace profiles.

WBM path:

WBM > Maintenance > Traces > (right-click) Trace Profiles > *Display All Trace Profiles*

The *List of Trace Profiles* mask is displayed. The name of each trace profile is displayed together with status information indicating whether the trace profile has been started.

6.6.6.2 Add Trace Profile (Empty Profile)

You can create a new, user-defined trace profile. In this case, the trace profile will only be assigned a name. To define the trace components that should be assigned with particular trace levels in the profile, you must modify the profile after you add it (see Section 6.6.6.8, "Edit Trace Profile").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Profiles > *Add Trace Profile (Empty Profile)*

The *Add Trace Profile* mask is displayed. You can edit the following field:

- *Profile Name*: Enter a suitable name for the profile.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The trace profile you have created now appears in the Trace Profiles tree structure and in the list of trace profiles (see Section 6.6.6.1, "Display All Trace Profiles").

6.6.6.3 Add Trace Profile (with Current Trace Settings)

You can create a new, user-defined trace profile. The profile will be assigned all trace components that are currently started, as well as their configured trace levels (see Section 6.6.7, "Trace Components" and Section 6.6.7.4, "Edit Trace Components").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Profiles > *Add Trace Profile (with Current Trace Settings)*

The *Add Trace Profile* mask is displayed. You can edit the following field:

- *Profile Name*: Enter a suitable name for the profile.

The trace components that are currently started are listed in the table underneath. The name of the trace component in each case is specified in the column on the left. You can edit the next two columns for each trace component:

- *Included*: Activate the field if the corresponding trace component should be assigned to this trace profile.

- *Level*: Specify the accuracy (trace level) that the corresponding trace component should apply in this profile. Trace levels have a value range from 0 to 9. 0 stands for the least amount, and 9 for the greatest amount of detail. Thus, the higher the number, the more trace information provided.

The following buttons are provided at the end of the table:

- *None* or *All* (in the *Included* column): Click this button to add all or none of the trace components listed to the current profile.
- *Set All to 0*, *Set All to 3*, *Set All to 6* or *Set All to 9* in the *Level* column: Click this button to configure a uniform trace level. Repeat if necessary.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The trace profile you have created now appears in the Trace Profiles tree structure and in the list of trace profiles (see Section 6.6.6.1, "Display All Trace Profiles").

6.6.6.4 Stop All Trace Profiles

You can stop all started trace profiles at once (see Section 6.6.6.6, "Start Trace Profile").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Profiles > *Stop All Trace Profiles*

The *Traces* tree structure is updated.

6.6.6.5 Display Trace Profile

You can view the data of an individual trace profile. This is possible for both predefined and user-defined trace profiles.

WBM path:

WBM > Maintenance > Traces > (double-click) Trace Profiles > (right-click) selected trace profile > *Display Trace Profile*

The *Trace Profile: [Name]* mask is displayed. The profile name is displayed together with status information indicating whether the trace profile is write-protected and whether it is currently started. The table underneath provides a list of the trace components assigned to the trace profile and the trace level configured in each case.

6.6.6.6 Start Trace Profile

You can start a trace profile that is currently stopped. This is possible for both predefined and user-defined trace profiles.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (double-click) Trace Profiles > (right-click) selected trace profile with red bullet point > *Start Trace Profile*

The *Traces* tree structure is updated.

6.6.6.7 Stop Trace Profile

This function allows you to stop a trace profile that is currently started. This is possible for both predefined and user-defined trace profiles.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (double-click) Trace Profiles > (right-click) selected trace profile with green bullet point > *Stop Trace Profile*

The *Traces* tree structure is updated.

6.6.6.8 Edit Trace Profile

You can modify a user-defined trace profile. This function is not available for predefined trace profiles.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (double-click) Trace Profiles > (right-click) user-defined trace profile > *Edit Trace Profile*

The *Trace Profile* mask is displayed. For descriptions of the individual fields, see Section 6.6.6.3, "Add Trace Profile (with Current Trace Settings)".

Click **Apply** followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.6.9 Delete Trace Profile

You can delete a user-defined trace profile. This function is not available for predefined trace profiles.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (double-click) Trace Profiles > (right-click) user-defined trace profile > *Delete Trace Profile*

An important warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.7 Trace Components

Trace components are gateway components for which process and status information can be logged. You can view and edit the settings for trace components as well as activating and deactivating monitoring by trace components.

See also: Section B.1.2, "Overview: Trace Components".

WBM path:

WBM > Maintenance > Traces > *Trace Components*

Right-click *Trace Components* to display a menu containing the following entries:

> Display All Trace Components
> Display Started Trace Components
> Display Stopped Trace Components
> Edit Trace Components
> Stop All Trace Components

Trace Components (folder):

Double-clicking *Trace Profiles* opens a tree structure where you can view the individual trace components. Trace components with a green bullet point have been started, those with a red bullet point have been stopped. Right-click an individual gateway to display a menu containing the following entries:

> Display Trace Component
> Edit Trace Component
> Start Trace Component / > Stop Trace Component

6.6.7.1 Display All Trace Components

You can view a list of all trace components containing detailed information.

WBM path:

WBM > Maintenance > Traces > (right-click) Trace Components > *Display All Trace Components*

The *List of Trace Profiles* mask is displayed. For each trace profile, the subsystem name, component index, and configured trace level are displayed together with status information as to whether the trace component is currently started.

6.6.7.2 Display Started Trace Components

You can view a list of all trace components that are currently started.

WBM path:

WBM > Maintenance > Traces > (right-click) Trace Components > *Display Started Trace Components*

The *List of Started Trace Components* mask is displayed. For each trace profile, the subsystem name and the configured trace level are displayed.

6.6.7.3 Display Stopped Trace Components

You can view a list of all trace components that are currently stopped.

WBM path:

WBM > Maintenance > Traces > (right-click) Trace Components > *Display Stopped Trace Components*

The *List of Stopped Trace Components* mask is displayed. For each trace profile, the subsystem name and the configured trace level are displayed.

6.6.7.4 Edit Trace Components

You can call up a list of all trace components containing detailed information, and modify the trace level data provided.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Components > *Edit Trace Components*

The *Edit All Trace Components* mask is displayed. The subsystem name is shown for each trace profile. You can edit the following fields:

- *Trace Level*: Specify the accuracy (trace level) that the corresponding trace component should apply. Trace levels have a value range from 0 to 9. 0 stands for the least amount, and 9 for the greatest amount of detail. Thus, the higher the number, the more trace information provided.
- *Trace On*: Activate this field to start the corresponding trace component.

> Certain trace components either cannot be modified, or only support restricted modification. Trace component elements which cannot be modified are grayed out.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.7.5 Stop All Trace Components

You can stop all started trace components at once (see Section 6.6.7.8, "Start Trace Component").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (right-click) Trace Components > *Stop All Trace Components*

The *Traces* tree structure is updated.

6.6.7.6 Display Trace Component

You can view detailed information for an individual trace component.

WBM path:

WBM > Maintenance > Traces > (double-click) Trace Components > (right-click) selected trace component > *Display Trace Component*

The *Trace Component mask: [Name]* is displayed. This mask shows the trace component index, subsystem name, configured trace level and whether the trace level is currently started. The area *Data Included in the Trace Output* lists the trace data that is logged for this trace component. Exact field descriptions are provided in Section 6.6.7.7, "Edit Trace Component".

6.6.7.7 Edit Trace Component

You can modify detailed information for an individual trace component.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (double-click) Trace Components > (right-click) selected trace component > *Edit Trace Component*

The *Trace Component mask: [Name]*is displayed. You can edit the following fields:

- *Trace Level*: Trace levels have a value range from 0 to 9. 0 stands for the least amount, and 9 for the greatest amount of detail. Thus, the higher the number, the more trace information provided.
- *Trace On*: Activate this option to monitor this component.
- *Data Included in the Trace Output*: You can define individually for each parameter whether it should be included in the trace output. Each selected parameter will be logged.

> Certain trace components either cannot be modified, or only support restricted modification. Trace component elements that cannot be modified are grayed out.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.6.7.8 Start Trace Component

You can start a trace component that is currently stopped.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (double-click) Trace Components > (right-click) selected trace component with red bullet point > *Start Trace Component*

The *Traces* tree structure is updated.

6.6.7.9 Stop Trace Component

You can stop a trace component that is currently started.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Traces > (double-click) Trace Components > (right-click) selected trace component with green bullet point > *Stop Trace Component*

The *Traces* tree structure is updated.

6.7 Events

Events report problems in the system. The administrator should check the network or gateway configuration to correct the irregularity.

For further information on events, see Section 9.9.3, "Events". For details on the log file for events, see Section 9.9.4, "Event Log Files".

WBM path:

WBM > Maintenance > *Events*

The *Events* tree structure is displayed.

Entries under *Events*:

> Event Configuration
> Event Log
> E-mail
> Reaction Table
> Diagnosis Logs

6.7.1 Event Configuration

You can view the event configuration settings and specify whether the event log should be transferred via a LAN.

WBM path:

WBM > Maintenance > Events > *Event Configuration*

Right-click *Event Configuration* to display a menu containing the following entries:

> Display Event Configuration
> Edit Event Configuration

6.7.1.1 Display Event Configuration

You can view the current event configuration settings.

WBM path:

WBM > Maintenance > Events > (right-click) Event Configuration > *Display Event Configuration*

The *Event Configuration* mask is displayed. For descriptions of the individual fields, see Section 6.7.1.2, "Edit Event Configuration".

6.7.1.2 Edit Event Configuration

A special tool, for example, TMT-Tracer or X-Trace, is needed for event logging over LAN. You can activate and deactivate event logging via LAN.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Events > (right-click) Event Configuration > *Edit Event Configuration*

The *Event Configuration* mask is displayed. You can edit the following field:

- *Switch Event Logging via LAN On*: Using this option you can activate and deactivate event logging.

The following fields provide additional information:

- *Maximum Event Buffer Size (byte)*: The number of log files saved to the buffer memory.
- *Maximum Event File Size (byte)*: The maximum size of the log file.
- *Event Timer (sec)*: The interval in seconds until data is written to the log file.
- *Timer Value (sec)*: The interval in seconds until data is transferred.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.7.2 Event Log

You can save an event file to an external system. It can then be opened, edited and printed using any text editor.

WBM path:

WBM > Maintenance > Events > *Event Log*

Right-click *Event Log* to display a menu containing the following entries:

> Load via TFTP
> Load via HTTP
> Clear Event Log

6.7.2.1 Load via TFTP

You can load the event log file from HG 1500 to a computer that has an ftp server.

> The *Load via TFTP* function is not available with an activated SSL (see Section 7.2.6, "SSL").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Events > (right-click) Event Log > *Load via TFTP*

The *Load Event Log from the Gateway via TFTP* mask is displayed. You can edit the following fields:

- *TFTP Server*: Enter the IP address of the server where the event log file should be saved. To save the data to this server, activate the radio button beside the input field.
- *Alternate TFTP Server*: Enter the IP address of an alternative server where the event log file should be saved. If the data should be saved to this server, activate the radio button beside the input field.

> The gateway automatically enters the IP addresses last entered for the default and alternative TFTP servers. You only need to edit these addresses if they have been changed.

- *Remote File Name (PC File System)*: Enter the file name under which the event log file should be saved.

Click *Load* followed by *OK* in the confirmation mask.

6.7.2.2 Load via HTTP

You can transfer the event log file from HG 1500 to the computer used to administer the gateway.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Events > (right-click) Event Log > *Load via HTTP*

Once the file has been transferred it will be shown immediately in the system editor.

6.7.2.3 Clear Event Log

The log file can be deleted from the gateway flash memory. This is useful if you have performed Load via TFTP or Load via HTTP.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Events > (right-click) Event Log > *Clear Event Log*

An important warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.7.3 E-mail

You can review and define the e-mail address to which a warning should be sent if an event occurs.

WBM path:

WBM > Maintenance > Events > *E-mail*

Right-click *E-mail* to display a menu containing the following entries:

> Display E-mail Settings
> Edit E-mail Settings

6.7.3.1 Display E-mail Settings

You can view detailed information on mail delivery when an event occurs.

WBM path:

WBM > Maintenance > Events > (right-click) E-mail > *Display E-mail Settings*

The *E-mail Settings* mask is displayed. For descriptions of the individual fields, see Section 6.7.3.2, "Edit E-mail Settings".

6.7.3.2 Edit E-mail Settings

You can modify detailed information for mail delivery when an event occurs.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Events > (right-click) E-mail > *Edit E-mail Settings*

The *E-mail Settings* mask is displayed. You can edit the following fields:

- *SMTP Server (IP Address)*: Enter the IP address of the computer via which e-mails routed using SMTP should be sent. As HG 1500 does not support authentication for SMTP, select an SMTP server without authentication.
- *SMTP Server (Port)*: Enter the SMTP server port. The default value is 25.
- *SMTP Domain*: Enter the domain name of the computer via which e-mails routed using SMTP should be sent. The SMTP domain corresponds to the domain name of the mail server.

> Comply with the conventions of standard protocols RFC 821 and RFC 822. SMTP server settings are required because HG 1500 only supports the "Relay Agent" function and cannot itself be used as an SMTP server.

- *From*: Enter the text that should appear in the "From" field in the case of notification e-mails.
- *Subject*: Enter the text that should appear in the "Subject" field in the case of notification e-mails. The subject line should specifically refer to a message in the event log.
- *Recipient 1* to *Recipient 5*: You can enter up to five e-mail addresses in this field. Notification e-mails are sent to all addresses entered.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.7.4 Reaction Table

You can define individually for Events how the system should react to this event.

WBM path:

WBM > Maintenance > Events > *Reaction Table*

Right-click *Reaction Table* to display a menu containing the following entries:

> Display All Events

Reaction Table (folder):

Double-clicking *Reaction Table* opens a tree structure where you can view the individual event messages. Right-click an individual event message to display a menu containing the following entries:

> Display Event
> Edit Event

6.7.4.1 Display All Events

You can view a table containing detailed information on all events.

WBM path:

WBM > Maintenance > Events > (right-click) Reaction Table > *Display All Events*

The *Event Reaction Configurations* mask is displayed. For each event message, the event name is displayed together with yes/no information on the effects of the event in question: whether an SNMP trap is sent (see Section 6.8.2, "Traps"), whether the gateway must be restarted if the event occurs, whether the HiPath system is notified if the event occurs, whether an e-mail is sent (see Section 6.7.3, "E-mail"), and whether a trace profile is started or stopped (see Section 6.6.6, "Trace Profiles").
If the event is assigned a trace profile, the name of this profile is shown.

6.7.4.2 Display Event

You can view detailed information for an individual event.

WBM path:

WBM > Maintenance > Events > (double-click) Reaction Table > (right-click) selected event > *Display Event*

The *Event Reaction Configurations* mask is displayed. For descriptions of the individual fields, see Section 6.7.4.3, "Edit Event".

6.7.4.3 Edit Event

You can modify detailed information for an individual event.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Events > (double-click) Reaction Table > (right-click) selected event > *Edit Event*

The *Event Reaction Configurations* mask is displayed. The following fields provide additional information:

- *Event Name*: The internal name of the event is shown.
- *Send an SNMP Trap*: This indicates whether an SNMP trap is sent when the event occurs (see Section 6.8.2, "Traps").
- *Reset Gateway*: This indicates whether the gateway must be restarted if the event occurs.
- *Notify HiPath*: This indicates whether a message is sent to the HiPath system if the event occurs.

You can edit the following fields:

- *Send an E-mail*: If this option is activated, an e-mail will be sent when this event occurs (see Section 6.7.3, "E-mail").
- *Associated Trace Profile*: You can assign one of the existing trace profiles to this event (see Section 6.6.6, "Trace Profiles").
- *Start/Stop Trace Profile*: You can specify whether the selected trace profile should be started or stopped by this event.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.7.5 Diagnosis Logs

The diagnosis logs created by the gateway can be viewed in a table and loaded via HTTP.

WBM path:

WBM > Maintenance > Events > *Diagnosis Logs*

Right-click *Diagnosis Logs* to display a menu containing the following entries:

> Get Diagnosis Logs

6.7.5.1 Get Diagnosis Logs

The diagnosis logs created by the gateway can be viewed in a table and loaded via HTTP.

WBM path:

WBM > Maintenance > Events > (right-click) Diagnosis Logs > *Get Diagnosis Logs*

The table *Load Diagnosis Logs from the Gateway via HTTP* is displayed. For each available log, the associated file name, the file size (in bytes), the last modification date and the file attributes are displayed.

6.8 SNMP

SNMP (**S**imple **N**etwork **M**anagement **P**rotocol) has been created for use with network management systems (NMS). NMS uses SNMP to integrate the management of network elements from different manufacturers.

WBM path:

WBM > Maintenance > *SNMP*

The *SNMP* tree structure is displayed.

Entries under *SNMP*:

> Communities
> Traps

If gateway problems occur, traps are generated to inform administrators of errors and failures. Access authorizations for SNMP data are regulated using communities. A community is a specific IP address.

6.8.1 Communities

Communities are IP addresses with special SNMP privileges.

WBM path:

WBM > Maintenance > SNMP > *Communities*

Right-click *Communities* to display a menu containing the following entries:

> Display Communities

Communities (folder):

Double-clicking *Communities* adds the following entries to the tree structure:

> Read Communities
> Write Communities
> Trap Communities

These are the available community types or access authorization classes.

6.8.1.1 Display Communities

You can display a list of all SNMP communities.

WBM path:

WBM > Maintenance > SNMP > (right-click) Communities > *Display Communities*

The *List of Communities* mask is displayed. For each community, the IP address, community name and authorization type (read community, write community or trap community) is displayed.

6.8.1.2 Read Communities

Read communities have the following access authorizations:

- MIB II (Management Interface Base); RFC 1213,
- HG 1500MIB (HLB2 configuration and statistics),
- RG2500MIB (MIB for some routing functions),
- HiPathCommonMonitoringMIB (commonNotificationGroup only).

WBM path:

WBM > Maintenance > SNMP > (double-click) Communities > *Read Communities*

Right-click *Read Communities* to display a menu containing the following entries:

> Display Read Communities
> Add Read Community

Read Communities (folder):

Double-clicking *Read Communities* extends the tree structure and shows all IP addresses (communities) assigned to this community type. Right-click the individual IP addresses to display a menu containing the following entries:

> Display Community
> Edit Community
> Delete Community

6.8.1.3 Display Read Communities

You can display a list of all read-enabled SNMP communities.

WBM path:

WBM > Maintenance > SNMP > (double-click) Communities > (right-click) Read Communities > *Display Read Communities*

The *List of Read Communities* mask is displayed. The IP address and community name is displayed for each community.

6.8.1.4 Add Read Community

You can add a new IP address to the read communities.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > SNMP > (double-click) Communities > (right-click) Read Communities > *Add Read Community*

The *Add Read Community* mask is displayed. You can edit the following fields:

- *IP Address*: Enter the IP address of the new trap recipient in this field.
- *Community*: This field defines the SNMP access rights. Enter the community as a character string.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.8.1.5 Write Communities

Write communities have the following access authorizations:

- MIB II (system group, TrapDestTable),
- HG1500MIB (control group),
- HiPathCommonMonitoringMIB (IPConnControlTable).

WBM path:

WBM > Maintenance > SNMP > (double-click) Communities > *Write Communities*

Right-click *Write Communities* to display a menu containing the following entries:

> Display Write Communities
> Add Write Community

Write Communities (folder):

Double-clicking *Write Communities* extends the tree structure and shows all IP addresses (communities) assigned this community type. Right-click the individual IP addresses to display a menu containing the following entries:

> Display Community
> Edit Community
> Delete Community

6.8.1.6 Display Write Communities

You can display a list of all write-enabled SNMP communities.

WBM path:

WBM > Maintenance > SNMP > (double-click) Communities > (right-click) Write Communities > *Display Write Communities*

The *List of Write Communities* mask is displayed. The IP address and community name is displayed for each community.

6.8.1.7 Add Write Community

You can add a new IP address to the write communities.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > SNMP > (double-click) Communities > (right-click) Write Communities > *Add Write Community*

The *Add Write Community* mask is displayed. You can edit the following fields:

- *IP Address*: Enter the IP address of the new trap recipient in this field.
- *Community*: This field defines the SNMP access rights. Enter the community as a character string.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.8.1.8 Trap Communities

Trap communities have trap authorization.

WBM path:

WBM > Maintenance > SNMP > (double-click) Communities > *Trap Communities*

Right-click *Trap Communities* to display a menu containing the following entries:

> Display Trap Communities
> Add Trap Community

Trap Communities (folder):

Double-clicking *Trap Communities* extends the tree structure and shows all IP addresses (communities) assigned this community type. Right-click the individual IP addresses to display a menu containing the following entries:

> Display Community
> Edit Community
> Delete Community

6.8.1.9 Display Trap Communities

You can display a list of all trap communities.

WBM path:

WBM > Maintenance > SNMP > (double-click) Communities > (right-click) Trap Communities > *Display Trap Communities*

The *List of Trap Communities* mask is displayed. The IP address and community name is displayed for each community.

6.8.1.10 Add Trap Community

You can add a new IP address to the trap communities.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > SNMP > (double-click) Communities > (right-click) Trap Communities > *Add Trap Community*

The *Add Trap Community* mask is displayed. You can edit the following fields:

- *IP address*: Enter the IP address of the new trap recipient in this field.
- *Community*: This field defines the SNMP access rights. Enter the community as a character string.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.8.1.11 Display Community

You can view detailed information on an individual community (IP address).

WBM path:

WBM > Maintenance > SNMP > (double-click) Communities > (double-click) Read Communities or Write Communities or Trap Communities > (right-click) selected IP address > *Display Community*

Depending on your selection, either the mask *Read Community*, *Write Community*, or *Trap Community* is displayed. The IP address and community name is displayed.

6.8.1.12 Edit Community

You can edit detailed information on an individual community (IP address).

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > SNMP > (double-click) Communities > (double-click) Read Communities or Write Communities or Trap Communities > (right-click) selected IP address > *Edit Community*

Depending on your selection, either the mask *Read Community*, *Write Community*, or *Trap Community* is displayed. You can edit the following fields:

- *IP Address*: Enter the IP address of the new trap recipient in this field.
- *Community*: This field defines the SNMP access rights. Enter the community as a character string.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.8.1.13 Delete Community

You can delete an individual community (IP address).

WBM path for read communities:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > SNMP > (double-click) Communities > (double-click) Read Communities or Write Communities or Trap Communities > (right-click) selected IP address > *Delete Community*

An important warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.8.2 Traps

If gateway problems occur, traps are generated to inform administrators of errors and failures. The following types of trap are available:

- System Traps (system errors that require immediate corrective action)
- Performance Traps (information on performance problems that do not require corrective action)

For further information on traps, see Section 9.9.1, "Traps".

Traps are classified according to their effect and are color-coded in the tree structure accordingly.

Effect Classes	Bullet Point Colors
Critical	Red
Major	Red
Minor	Orange
Warning	Yellow
Deleted	Green
Informative	Gray
Intermediate status	Gray
Other traps	Gray

Table 6-1 Effect Classes for Traps

Traps are displayed in the tree structure in the order that they occur in the system.

WBM path:

WBM > Maintenance > SNMP > *Traps*

Right-click *Traps* to display a menu containing the following entries:

> Display All Traps
> Display All Critical Traps
> Refresh

Traps (folder):

If traps are available, the entry *Traps* is represented by a folder icon in the tree structure. Double-clicking *Traps* adds the available traps to the tree structure. The following function is available in this case:

> Display Trap

6.8.2.1 Display All Traps

You can display a list containing detailed information on all traps currently available in the system.

WBM path:

WBM > Maintenance > SNMP > (right-click) Traps > *Display All Traps*

The *List of All Traps* mask is displayed. Traps are displayed in the table in the order that they occur in the system. The display is automatically updated every 30 seconds. However, by clicking *Refresh*, you can also update the list manually at any time.

6.8.2.2 Display All Critical Traps

You can display a list containing detailed information on system-critical traps (those indicated by a red bullet point).

WBM path:

WBM > Maintenance > SNMP > (right-click) Traps > *Display All Critical Traps*

The *List of All Critical Traps* mask is displayed. Traps are displayed in the table in the order that they occur in the system. The display is automatically updated every 30 seconds. However, by clicking *Refresh*, you can also update the list manually at any time.

6.8.2.3 Refresh

You can update the trap tree structure at any time.

WBM path:

WBM > Maintenance > SNMP > (right-click) Traps > *Refresh*

The tree structure is updated.

6.8.2.4 Display Trap

You can view detailed information for an individual trap.

WBM path:

WBM > Maintenance > SNMP > (double-click) Traps > (right-click) selected trap > *Display Trap*

The following trap information is displayed: The first four entries displayed have the following meaning:

- Trap severity (for example, Information)
- Trap name
- Explanation of this trap
- Trap type (1 = software, 2 = hardware)

6.9 Admin Log

The administration log is generated on the gateway. Logins are logged on the gateway. You can review and configure the protocol language. You can also download the log file, and delete it, from the gateway.

WBM path:

WBM > Maintenance > *Admin Log*

The *Admin Log* tree structure is displayed.

Entries under *Admin Log*:

> Configuration
> Admin Log Data

6.9.1 Configuration

You can review and configure the administration log language on the gateway.

WBM path:

WBM > Maintenance > Admin Log > *Configuration*

Right-click *Configuration* to display a menu containing the following entries:

> Display Configuration
> Edit Configuration

6.9.1.1 Display Configuration

You can review the language configured for the administration log.

WBM path:

WBM > Maintenance > Admin Log > (right-click) Configuration > *Display Configuration*

The *Admin Log Properties* mask is displayed.

6.9.1.2 Edit Configuration

You can configure a different language for the administration log.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Admin Log > (right-click) Configuration > *Edit Configuration*

The *Admin Log Properties* mask is displayed. You can edit the following field:

- *Admin Log Language*: Select the required language. You can choose between English and German.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.9.2 Admin Log Data

You can download the administration log, and delete it, from the gateway.

WBM path:

WBM > Maintenance > Admin Log > *Admin Log Data*

Right-click *Admin Log Data* to display a menu containing the following entries:

> Load via TFTP
> Load via HTTP
> Delete Log File on Gateway

6.9.2.1 Load via TFTP

You can load the administration log file from HG 1500 to a computer that has an ftp server.

> The *Load via TFTP* function is not available with an activated SSL (see Section 7.2.6, "SSL").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Admin Log > (right-click) Admin Log Data > *Load via TFTP*

The *Load Admin Log from the Gateway via TFTP* mask is displayed. You can edit the following fields:

- *TFTP Server*: Enter the IP address of the server where the log file should be saved. To save the data to this server, activate the radio button beside the input field.

- *Alternate TFTP Server*: Enter the IP address of an alternative server where the log file should be saved. If the data should be saved to this server, activate the radio button beside the input field.

> The gateway automatically enters the IP addresses last entered for the default and alternative TFTP servers. You only need to edit these addresses if they have been changed.

- *Remote File Name (PC File System)*: Enter the file name under which the log file should be saved.

Click *Load* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.9.2.2 Load via HTTP

You can transfer the administration log file from HG 1500 to the computer used to administer the gateway.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Admin Log > (right-click) Admin Log Data > *Load via HTTP*

Once the file has been transferred it will be shown immediately in the system editor.

6.9.2.3 Delete Log File on Gateway

The log file can be deleted from the gateway flash memory. This is useful if you have performed Load via TFTP or Load via HTTP.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Admin Log > (right-click) Admin Log Data > *Delete Log File on Gateway*

A warning is displayed. Click *Delete Log* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

6.10 Actions

The "Actions" maintenance function supports frequently recurring administrative tasks. Some actions must be performed manually; others are performed automatically. Log data can be deleted manually. Garbage collection and software image activation can be implemented automatically on the gateway.

WBM path:

WBM > Maintenance > *Actions*

The *Actions* tree structure is displayed.

Entries under Actions:

> Manual Actions
> Automatic Actions

6.10.1 Manual Actions

You can delete various log data from the gateway.

WBM path:

WBM > Maintenance > Actions > *Manual Actions*

Manual Actions (folder):

Double-clicking *Manual Actions* adds the following entries to the tree structure:

> Trace Log
> Event Log
> Admin Log
> PPP Log
> All Logs

6.10.1.1 Trace Log

You can delete the trace log from the gateway.

WBM path:

WBM > Maintenance > Actions > (double-click) Manual Actions > *Trace Log*

Right-click *Trace Log* to display a menu containing the following entries:

> Load data via HTTP
> Delete Data

6.10.1.2 Event Log

You can delete the trace log from the gateway.

WBM path:

WBM > Maintenance > Actions > (double-click) Manual Actions > *Event Log*

Possible actions:

> Load data via HTTP
> Delete Data

6.10.1.3 Admin Log

You can delete the trace log from the gateway.

WBM path:

WBM > Maintenance > Actions > (double-click) Manual Actions > *Admin Log*

Right-click *Admin Log* to display a menu containing the following entries:

> Load data via HTTP
> Delete Data

6.10.1.4 PPP Log

You can delete the trace log from the gateway.

WBM path:

WBM > Maintenance > Actions > (double-click) Manual Actions > *PPP Log*

Right-click *PPP Log* to display a menu containing the following entries:

> Load data via HTTP
> Delete Data

6.10.1.5 All Logs

You can load data via HTTP.

WBM path:

WBM > Maintenance > Actions > (double-click) Manual Actions > *All Logs*

Right-click *All Logs* to display a menu containing the following entries:

> Load data via HTTP

6.10.1.6 Delete Data

You can delete selected log data from the gateway.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Manual Actions > (right-click) Trace Log or (right-click) Event Log or (right-click) Admin Log or (right-click) PPP Log > *Delete Data.*

A warning is displayed. Click *Delete Log* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

> The "Delete Log" menu item is not available for All Logs.

See also:
Section 6.6.3.4, "Clear Trace Log",
Section 6.7.2.3, "Clear Event Log",
Section 6.9.2.3, "Delete Log File on Gateway".

6.10.1.7 Load data via HTTP

You can load selected data to the gateway via HTTP.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Manual Actions > (right-click) Trace Log or (right-click) Event Log or (right-click) Admin Log or (right-click) PPP Log > or (right-click) All Logs > *Load Data via HTTP.*

You can select the diagnostic logs to be loaded (trace, event, DDC, PPP log, or all). A ZIP file is delivered containing the selected logs as well as a file with information on the system and system time.

See also:
Section 6.6.3.2, "Load via HTTP".

6.10.2 Automatic Actions

Automatic actions are started by the system either once only, or at regular intervals at configurable times. You can use automatic actions to start garbage collection on HG 1500 and activate a software image.

WBM path:

WBM > Maintenance > Actions > *Automatic Actions*

Automatic Actions (folder):

Double-clicking *Automatic Actions* adds the following entries to the tree structure:

> Garbage Collection
> Software Activation
> DLS Notification

If a bullet point is green, the automatic action has been started; if it is red, the action has not yet been started.

6.10.2.1 Garbage Collection

Garbage collection on HG 1500 can be started automatically.

WBM path:

WBM > Maintenance > Actions > (double-click) Automatic Actions > *Garbage Collection*

Right-click *Garbage Collection* to display a menu containing the following entries:

> Display Action
> Edit Action
> Start Action / Stop Action

Display Action

You can review the current settings for automatically starting an action.

WBM path:

WBM > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Garbage Collection > *Display Action*

The *Edit Automatic Action* mask is displayed. For descriptions of the individual fields, see Edit Action.

Edit Action

You can edit the settings for automatically starting an action.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Garbage Collection > *Edit Action*

The *Edit Automatic Action* mask is displayed.

You can edit the following fields:

- *Action Activated*: Select whether the action should be started automatically at the specified times.
- *Start Time (after Midnight)*: Specify the time when the action should begin.
- *Days on which to Perform Action*: Select the days on which the action should be started at the specified time.

Start Action

When an automatic action has been stopped (red bullet point in the tree structure), it can be started. The action will then be performed at the time specified.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Garbage Collection> *Start Action*

The *Actions* tree structure is updated.

Stop Action

When an automatic action has been started (green bullet point in the tree structure), it can be stopped. If the action is stopped at the automatic start time specified, it will not be started.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Garbage Collection > *Stop Action*

The *Actions* tree structure is updated.

6.10.2.2 Software Activation

A new software image can be automatically activated on the HiPath HG 1500.

WBM path:

WBM > Maintenance > Actions > (double-click) Automatic Actions > *Software Activation*

Right-click *Software Activation* to display a menu containing the following entries:

> Display Action
> Edit Action
> Stop Action

Display Action

You can review the current settings for automatically starting an action.

WBM path:

WBM > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Software Activation > *Display Action*

The *Edit Automatic Action* mask is displayed. For descriptions of the individual fields, see Edit Action.

Edit Action

You can edit the settings for automatically starting an action.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Software Activation > *Edit Action*

The *Edit Automatic Action* mask is displayed.

You can edit the following fields:

- *Start Action in*: Specify the time in days, hours and minutes until the action is started.
- *Start Action on*: Specify the date and time when the action should be performed.

Click *Use Calendar* to select the date from a calendar. The display now includes a calender. You can scroll between years and months with the arrow keys. Click the required day to copy the date to the start field.

The version of the inactive software image which has been loaded is displayed. The *Apply* button is only active when a software image is available.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

Start Action

When an automatic action has been stopped (red bullet point in the tree structure), it can be started. The action will then be performed at the time specified.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Software Activation> *Start Action*

The *Actions* tree structure is updated.

Stop Action

When an automatic action has been started (green bullet point in the tree structure), it can be stopped. If the action is stopped at the automatic start time specified, it will not be started.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) Software Activation > *Stop Action*

The *Actions* tree structure is updated.

6.10.2.3 DLS Notification

On each startup a notification can be sent to the Deployment and Licensing Server (DLS) indicating that the HG 1500 is ready from this point on.

WBM path:

WBM > Maintenance > Actions > (double-click) Automatic Actions > *DLS Notification*

Right-click *Software Activation* to display a menu containing the following entries:

> Display Action
> Edit Action
> Stop Action

Display Action

You can review the current settings for automatically starting an action.

WBM path:

WBM > Maintenance > Actions > (double-click) Automatic Actions > (right-click) DLS Notification > *Display Action*

The *Edit Automatic Action* mask is displayed. For descriptions of the individual fields, see Edit Action.

Edit Action

You can edit the settings for automatically starting an action.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) DLS Notification > *Edit Action*

The *Edit Automatic Action* mask is displayed.

You can edit the following fields:

- *Action Activated:* Select whether the action should be started automatically.
- *IP address:* IP address of the DLS server
- *Port:* DLS server port
- *Username:* User name for the DLS server
- *Password:* Password for the DLS server

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

Stop Action

When an automatic action has been started (green bullet point in the tree structure), it can be stopped. If the action is stopped at the automatic start time specified, it will not be started.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Maintenance > Actions > (double-click) Automatic Actions > (right-click) DLS Notification > *Stop Action*

The *Actions* tree structure is updated.

7 Explorers

In this module you will find functions required for the configuration of the HG 1500.

WBM path:

WBM > *Explorers*

The *Explorers* module's options are displayed on the left.

Options in the *Explorers* module:

> Basic Settings
> Security
> Network Interfaces
> Routing
> Voice Gateway
> VCAPI
> Payload
> Statistics

7.1 Basic Settings

The basic settings of the HG 1500 contain visible hardware data and editable basic data of the gateway functions.

WBM path:

WBM > Explorers > *Basic Settings*

The tree structure for *Basic Settings* is displayed.

Entries under *Basic Settings*:

> System
> Gateway
> License Management
> ILS Settings
> DynDNS
> AF/EF Codepoints
> Quality of Service
> SNTP settings
> Port management
> Online Help Directory

7.1.1 System

The "System" folder provides information on the current status or the current configuration of key system components.

WBM path:

WBM > Explorers > Basic Settings > *System*

System (folder):

The following entries are displayed if you double-click the folder icon *System*:

> Hardware Configuration
> Software Build
> CPU
> Temperature Sensor
> Memory
> Flash
> Net Stack Resources

7.1.1.1 Hardware Configuration

This entry allows you to view detailed information about the HG 1500 hardware.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (single-click) *Hardware Configuration*

The *Hardware Configuration* dialog is displayed. It offers the following information:

- Start parameters ("Boot Line")
- Hardware identification of the board (board ID in HiPath 3000, e.g. 0x007D)
- Serial Number (system serial number - corresponds to the sticker on the board, e.g., SPU34030530131)
- Parts List (parts list version, e.g. -04)
- Board Revision (HXG3 board version, e.g. 0x04)
- Boot ROM Version
- FPGA (Field Programmable Gate Array) version data. (FPGA CID version is the chip version, e.g. 2 and FPGA FW version is the version for the EEPROM FPGA code, e.g. 1.5)
- DELIC (DSP Embedded Line and Port Interface Controller) Firmware Version.

Display Hardware Configuration

See Hardware Configuration.

7.1.1.2 Software Build

Software Build Version displays the version of the active software.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (single-click) *Software Build*

The *Software Build Version* mask is displayed. The software version, the operating status and the HiPath system version are displayed. If another software image has been loaded but not yet activated, the version and file size of the software image awaiting installation are displayed.

Display Software Build Version

See Software Build.

7.1.1.3 CPU

This entry allows you to display the configuration of the main processor.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (single-click) *CPU*

The *CPU Configuration* mask is displayed. This mask contains information about the processor type and speed.

Display CPU Configuration

See CPU.

7.1.1.4 Temperature Sensor

This entry allows you to display the current settings and values for the temperature sensor.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > *Temperature Sensor*

The HXGM board variant does not feature a temperature sensor. The temperature is always displayed as "0° C" here.

Right-click *Temperature Sensor* to display a menu containing the following entries:

> Display Temperature Sensor State
> Display Temperature Sensor

Display Temperature Sensor State

This option allows you to check if the temperature sensor is active and what time cycle is set.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Temperature Sensor > *Display Temperature Sensor State*

The *Temperature Sensor State* mask appears. It indicates if the temperature sensor is active or inactive. *Monitoring Timer* indicates the length of time (in seconds) during which the measured temperature is compared with the threshold value. *Monitoring Logging Timer (sec)* indicates the length of time (in seconds) before an event is logged in the log file.

Display Temperature Sensor

Displays the current temperature.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Temperature Sensor > *Display Temperature Sensor*

The *Temperature Sensor* mask is displayed. The current temperature and the sensor's maximum reached temperature are displayed. The threshold values for a warning and automatic system shutdown are also displayed.

If the language in Internet Explorer is set to "English", the temperatures are also displayed in degrees Fahrenheit.

7.1.1.5 Memory

This entry allows you to display details on memory usage.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > *Memory*

Right-click *Memory* to display a menu containing the following entries:

> Display Memory State
> Display System Memory Usage
> Display DMA Memory Usage

Display Memory State

This option allows you to check if memory monitoring is active and what time cycle is set.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Memory > *Display Memory State*

The *Memory State* mask appears. It displays if memory monitoring is active or inactive. *Monitoring Timer (sec)* indicates the length of time (in seconds) during which the measured usage is compared with the threshold value. *Monitoring Logging Timer (sec)* indicates the length of time (in seconds) before an event is logged in the log file.

Display System Memory Usage

This option allows you to display the current system memory usage.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Memory > *Display System Memory Usage*

The *System Memory Usage* mask is displayed. The following parameters are displayed:

- *Absolute Memory Size (free/used)*: Number of total, free and allocated bytes, number of free and allocated blocks, size of the largest free block.
- *Memory Used (in %)*: Current system memory usage as a percentage and maximum system memory usage until the information is displayed.

Display DMA Memory Usage

This option allows you to display the current DMA memory usage.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Memory > *Display DMA Memory Usage*

The *DMA Memory Usage* mask is displayed. The following parameters are displayed:

- *Absolute Memory Size (free/used)*: Number of total, free and allocated bytes, number of free and allocated blocks, size of the largest free block.
- *Memory Used (in %)*: Current system memory usage as a percentage and maximum system memory usage until the information is displayed.

7.1.1.6 Flash

This entry allows you to display details on flash memory usage.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > *Flash*

Right-click *Flash* to display a menu containing the following entries:

> Display Flash State
> Display Flash Usage

Display Flash State

This option allows you to check if the temperature sensor is active and what time cycle is set.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Flash > *Display Flash State*

The *Flash Memory State* mask is displayed. It indicates if flash monitoring is active. *Monitoring Timer (sec)* indicates the length of time (in seconds) during which the measured usage is compared with the threshold value. *Monitoring Logging Timer (sec)* indicates the length of time (in seconds) before an event is logged in the log file.

Display Flash Usage

This option allows you to display the current system memory usage.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Flash > *Display Flash Usage*

The *Flash Memory Usage* mask is displayed. The following parameters are displayed:

- *Flash Memory Size*: Size of the total memory and the size of the used and free areas in bytes.
- *Flash Memory Used (in %)*: Current system memory usage as a percentage and maximum system memory usage until the information is displayed.

7.1.1.7 Net Stack Resources

You can display the available resources as well as the state of the net stack memory.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > *Net Stack Resources*

Right-click *Net Stack Resources* to display a menu containing the following entries:

> Display Net Pool State
> Display System Pools
> Display Data Pools

Display Net Pool State

This option allows you to check if memory monitoring is active and what time cycle is set.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Net Stack Resources > *Display Net Pool State*

The *Net Stack Pool Status* mask is displayed. It indicates if net stack monitoring is active. *Monitoring Timer (sec)* indicates the length of time (in seconds) during which the measured usage is compared with the threshold value. *Monitoring Logging Timer (sec)* indicates the length of time (in seconds) before an event is logged in the log file.

Display System Pools

This option allows you to display the net stack resources for system pools.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Net Stack Resources > *Display System Pools*

The *Net Stack Resources for System Pools* mask is displayed. It displays the number of allocated and available blocks in the net stack memory system pool in block sizes of 64 bytes, 128 bytes, 256 bytes and 512 bytes. The mask also provides information on used and free elements, the current use and the maximum use so far.

Display Data Pools

This option allows you to display the net stack resources for data pools.

WBM path:

WBM > Explorers > Basic Settings > (double-click) System > (right-click) Net Stack Resources > *Display Data Pools*

The *Net Stack Resources for Data Pools* mask is displayed. It displays the number of allocated and available blocks in the net stack memory data pool in block sizes of 64 bytes, 128 bytes, 256 bytes, 512 bytes, 1024 bytes and 2048 bytes. The mask also provides information on used and free elements, the current use and the maximum use so far.

7.1.2 Gateway

This entry allows you to display and edit the gateway properties and settings.

WBM path:

WBM > Explorers > Basic Settings > *Gateway*

Right-click *Gateway* to display a menu containing the following entries:

> Display Gateway Properties
> Edit Gateway Properties

7.1.2.1 Display Gateway Properties

This option allows you to display the gateway properties and settings.

WBM path:

WBM > Explorers > Basic Settings > (right-click) Gateway > *Display Gateway Properties*

The *Gateway Properties* mask is displayed. For descriptions of the individual fields, see Section 7.1.2.2, "Edit Gateway Properties".

7.1.2.2 Edit Gateway Properties

This option allows you to edit the gateway properties and settings.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (right-click) Gateway > *Edit Gateway Properties*

The *Gateway Properties* mask is displayed. You can display and edit the following data:

- *HG 1500 slot number*: The slot number of the HiPath HG 1500 is displayed here for information purposes.

- *System Name*: This field contains the name of the system. Enter a character string in this field.
- *Gateway Location*: This field contains information about the installation site for the HiPath 3000 system. This information helps service technicians to locate the gateway when the device needs to be physically accessed. Enter a character string in this field.
- *Contact Address*: This field contains information about the person to be contacted if problems arise with the gateway. Enter a character string in this field.
- *System Country Code*: The country code set during installation and the relevant country are displayed for information purposes. This entry cannot be modified here.
- *Function Type*: The gateway IP address and the subnet mask are displayed for information purposes.
- *Gateway IP Address*: The gateway’s IP address is displayed for information purposes. This entry cannot be modified here.
- *Gateway Subnet Mask*: The gateway’s subnet mask is displayed for information purposes. This entry cannot be modified here.
- *Enhanced B Channels*: Select this option if you want to use up to 60 B channels (disabled: up to 32 B channels).
  You cannot use the internal firewall and VPN/IPsec features if you activate the Enhanced B Channels option. If these features are active, a warning is output when you try to enable them. The features will be disabled if you confirm this warning with "OK".
- *DMC Interworking*: This entry indicates if DMC Interworking is active.
- *Use Gatekeeper*: In this field, select the gatekeeper where the HG 1500must register. *Cisco* must be set for a Cisco gatekeeper. *OpenScape Voice* must be set for a gatekeeper in OpenScape Voice. You can use *default* for all other scenarios.
- *Protocol Variant "Extended Fast Connect" Active*: This field displays whether or not the protocol variant "Extended Fast Connect" is active. In HiPath 3000/5000 V7, the CorNet-IP protocol has been enhanced to include the protocol variant EFC (Extended Fast Connect). EFC is required for features such as signaling ad voice data encryption in company networks (LAN) and IP/IP E2E Payload Via Enterprise Proxy for Internet telephony. If EFC is enabled, all IP workpoints (HFA) in a system or all IP workpoints (HFA) in a network must be EFC-capable. The EFC protocol is activated in initial state (default). This setting should not be changed because this can otherwise lead to restrictions in features.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.3 License Management

This option allows you to display the active licenses required for using the gateway. The licenses can be edited via central license management in HiPath 3000 Manager E (see also Section 3.5, "HiPath Management with HiPath 3000 Manager E").

WBM path:

WBM > Explorers > Basic Settings > *License Management*

Right-click *License Management* to display a menu containing the following entries:

> Display Licenses

7.1.3.1 Display Licenses

This option allows you to display the active licenses required for using the gateway.

WBM path:

WBM > Explorers > Basic Settings > (right-click) License Management > *Display Licenses*

The *Licenses* mask is displayed. The following data is displayed:

- *MAC Address*: This field contains the hardware ID number of the gateway.
- *Number of Licensed B Channels*: This field contains the number of B channels licensed in the gateway.
- *Number of Licensed System Clients*: This field contains the number of licensed system users.
- *CA License*: This field displays if a license for the CA function (CA – Certificate Authority) has been obtained and is activated.
- *IPsec License*: This field displays if a license for the IPsec function (IPsec – IP Security) has been obtained and is activated.

7.1.4 ILS Settings

The Internet Locator Server (ILS) is responsible for centralized provision of IP addresses for all HG 1500 gateways involved in IP networking. The gateways must first log on to the ILS with their board ID and IP address. From then on, the gateways only need use their board ID for logging onto the ILS, which then returns the required IP address.

The gateway IP addresses therefore no longer need to be administered manually via the WBM. Modifications to IP addresses are now only relevant to the ILS.

In addition to the general ILS settings, you must specify that ILS is to be used for address resolution in order to use the ILS function (see Section 7.5.6.4, "Nodes").

WBM path:

WBM > Explorers > Basic Settings > *ILS Settings*

Right-click *ILS Settings* to display a menu containing the following entries:

> Display
> Edit

7.1.4.1 Display

This option allows you to display the ILS settings.

WBM path:

WBM > Explorers > Basic Settings > (right-click) ILS Settings > *Display*

The *ILS Settings* mask is displayed. The IP address of the ILS server and the ILS network name are specified here.

7.1.4.2 Edit

This option allows you to edit the ILS settings.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (right-click) ILS Settings > *Edit*

The *ILS Settings* mask is displayed. You can edit the following data:

- *IP Address of ILS Server*: Enter the IP address of the ILS in this field.
- *Unique ILS Network Name*: Enter a unique name for the ILS network in this field.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.5 DynDNS

The abbreviation DynDNS stands for "dynamic Domain Name Service". DynDNS allows you to assign a fixed host name to the dynamic assigned IP addresses supplied by your Internet Service Provider. The Internet service offered by the site *DynDNS.org* is used for this purpose. Please refer to http://www.dyndns.org/services/dyndns/ for further information.

You can use the DynDNS service to access the HG 1500 from different locations without knowing the current IP address of the gateway.

WBM path:

WBM > Explorers > Basic Settings > *DynDNS*

Double-clicking *DynDNS* leads you to the following subentries:

> DynDNS Service
> Update Timer for DNS Names

7.1.5.1 DynDNS Service

This entry allows you to display and edit the DynDNS settings.

WBM path:

WBM > Explorers > Basic Settings > (right-click) DynDNS > *DynDNS Service*

Right-click *DynDNS Service* to display a menu containing the following entries:

> Display
> Edit

Display DynDNS Configuration

This option allows you to display the current settings for the DynDNS user account, the desired host name and a host of other configuration details.

WBM path:

WBM > Explorers > Basic Settings > DynDNS > (right-click) DynDNS Service > *Display DynDNS Configuration*

The *DynDNS Configuration* mask is displayed. For descriptions of the individual fields, see Section 7.1.5.1, "Edit DynDNS Configuration".

Edit DynDNS Configuration

This option allows you to edit the current settings for the DynDNS user account, the desired host name and a host of other configuration details.

WBM path:

WBM > Explorers > Basic Settings > DynDNS > (right-click) DynDNS Service > *Edit DynDNS Configuration*

The *DynDNS Configuration* mask is displayed. You can edit the following data:

- *User Name*: In this field, enter the user name of your user account for the DynDNS service. Go to http://www.dyndns.org/account/create.html to create a user account, if necessary.
- *Password*: In this field, enter the password of your user account for the DynDNS service. For security reasons, only wildcards are displayed as you type the password in this field.
- *Host Name*: Enter the host name without the domain name in this field. For example, if the full DynDNS subdomain name is *myhost.DynDNS.org*, you should enter *myhost* in this field.
- *Domainname*: Select the domain name. The full subdomain name for HG 1500 is made up of the host name and the selected domain name. For example, if you entered *myhost* in the Host Name field, and you now select *dyndns.org* as domain name, the full subdomain name would be *myhost.dyndns.org*.
- *Enable Wildcard*: If you activate this option, any queries to subdomains such as *any.myhost.dyndns.org* will be routed to *myhost.dyndns.org*.
- *Mail Exchanger*: The so-called MX record (Mail Exchanger) indicates in the Domain Name Service to which IP address or to which domain name E-mails for the configured DynDNS domain are to be sent. The specified destination address must be the address of a mail server.
- *Backup MX*: If you activate this option, E-mails which are not delivered to the specified Mail Exchanger because it is temporarily not available, will be buffered by the DynDNS service and will finally be delivered once your Mail Exchanger is available again.

The following data is displayed for verification purposes:

- *Last Update*: Time when the DynDNS service was updated last.
- *IP Address at DynDNS*: IP address at the DynDNS service, to which queries that are addressed to your configured DynDNS subdomain are rerouted.
- *Own dynamic IP Address*: Current IP address of HG 1500 assigned by the Internet Service Provider.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.5.2 Update Timer for DNS Names

When DNS names are used in rules or tunnel definitions, the DNS names must be resolved as IP addresses by sending DNS queries to the DNS server.

If dynamic IP addresses are used in the whole system, these resolutions must take place periodically. The time interval at which the DNS names are to be updated may be set.

If all IP addresses are fixed, but DNS names are nevertheless in use, then the periodic updating of the DNS names can be disabled. In any case, however, if DNS names are used in the Gateway, all DNS names will be resolved after the Gateway is rebooted and after the configured VPN tables are activated.

You can display and edit the update timer settings.

WBM path:

WBM > Explorers > Basic Settings > (right-click) DynDNS > *Update Timer for DNS Names*

Right-click *Update Timer for DNS Names* to display a menu containing the following entries:

> Display Update Timer
> Edit Update Timer

Display Update Timer

This option allows you to view the settings for the time at which the DNS names are updated.

WBM path:

WBM > Explorers > Basic Settings > DynDNS > (right-click) Update Timer for DNS Names > *Display Update Timer*

The *DNS Name Update Timer*mask is displayed. For descriptions of the individual fields, see Section 7.1.5.2, "Edit Update Timer".

Edit Update Timer

This option allows you to edit the settings for the time at which the DNS names are updated.

WBM path:

WBM > Explorers > Basic Settings > DynDNS > (right-click) Update Timer for DNS Names > *Edit Update Timer*

The *DNS Name Update Timer*mask is displayed. You can edit the following data:

- Update DNS Names: If this option is activated, the DNS names used in the Gateway will be periodically updated after the time interval set under "Time Interval for Updating DNS Names“. If this option is not activated, no periodic update will take place.
- *Update Timer Value for DNS Names (sec)*: In this field, enter the number of seconds for the interval between two updates. The default value for this field is 600, which corresponds to an update interval of 10 minutes.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.6 AF/EF Codepoints

The various priorities are defined by "Expedited Forwarding" (EF) and "Assured Forwarding" (AF) codepoints. The value to be entered corresponds to the "Type of Service" field in the IP header. You can display the corresponding gateway settings.

Background information:

See Section 9.3, "Quality of Service (QoS)"

WBM path:

WBM > Explorers > Basic Settings > *Display AF/EF Codepoints*

Right-click *AF/EF Codepoints* to display a menu containing the following entries:

> Display AF/EF Codepoints

7.1.6.1 Display AF/EF Codepoints

This option allows you to display the AF/EF codepoints.

WBM path:

WBM > Explorers > Basic Settings > (right-click) AF/EF Codepoints >
Display AF/EF Codepoints

The *AF/EF Codepoints* mask is displayed. Priorities are assigned in the form of hexadecimals.

- *AF*: guarantees minimum bandwidth for the data from one of a number of classes. Lower priority classes share the bandwidths not used by EF or other high-priority classes. A "Dropping Level" can be defined for every class; this specifies the speed at which packets are rejected if the system is unable to forward them fast enough.
- *EF*: guarantees constant bandwidth for this data. If this defined value is reached, all packets that would exceed this bandwidth are rejected.

Four classes are reserved for AF:

- AF1x (lowest priority)
- AF2x
- AF3x
- AF4x (highest priority).

In the AF class, the value x stands for the "Dropping Level":

- 1 (low), packets are buffered for an extended length of time

- 2 (medium), packets are buffered for a medium length of time
- 3 (high), packets are promptly rejected

7.1.7 Quality of Service

In HG 1500, "Quality of Service" is supported by IP packet prioritization. Prioritization is performed on the basis of information in the IP header. For this to work, the relevant transmission partner must use the same "Quality of Service" procedure. You can display and edit this procedure.

In the case of IP data traffic, packets produced by HG 1500 are split into various groups. For some of these groups, you can set which codepoint (see also Section 7.1.6, "AF/EF Codepoints") is to be used for marking the packets.

Background information:

See Section 9.3, "Quality of Service (QoS)"

WBM path:

WBM > Explorers > Basic Settings > *Quality of Service*

Right-click *Quality of Service* to display a menu containing the following entries:

> Display Quality of Service Settings
> Editing Quality of Service settings

7.1.7.1 Display Quality of Service Settings

This option allows you to display the current gateway settings for quality of service.

WBM path:

WBM > Explorers > Basic Settings > (right-click) Quality of Service > *Display Quality of Service Settings*

The *Quality of Service* mask is displayed. For descriptions of the individual fields, see Section 7.1.7.2, "Editing Quality of Service settings".

7.1.7.2 Editing Quality of Service settings

This option allows you to edit the current gateway settings for quality of service.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (right-click) Quality of Service > *Edit Quality of Service Settings*

The *Quality of Service* mask is displayed. You can edit the following data:

- *Priority Class for Signaling Data*: Select the relevant priority class for connection setup.
- *Priority Class for Fax/Modem Payload*: Select the relevant priority class for the fax and modem data of the IP connection.
- *Priority Class for Network Control*: Select the desired priority class for the network control data (e. g. transfer of SNMP traps).
- *Priority Class for Voice Payload*: Select the desired priority class for the IP connection voice data.

  The various priorities are defined by means of AE/EF codepoints (see also Section 7.1.6.1, "Display AF/EF Codepoints"). In addition, the following can be selected:

  - *CS7*: The "Class Selector 7" (CS7) priority is used for network control packets (for example, SNMP).
  - *Best effort*: This priority is designed for typical router behavior.
- *QoS Procedure*: Select one of the following procedures:
  - *DiffServ*: The transmission partner prefers to work with the evaluation of the "Differentiate Services" 6-bit field (newer procedure).
  - *IP Precedence:* The transmission partner prefers to work with the evaluation of the "IP Precedence" 3-bit field (older procedure).
  - *Autodetect*: Both "DiffServ" and "IP Precedence" are accepted for the evaluation.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

> In general, the preset values do not need to be changed.

7.1.8 SNTP settings

SNTP (Simple Network Time Protocol), described in RFC2030 (http://rfc.net/rfc2030.html), is used for synchronizing the clocks on networked PCs. HiPath HG 1500 features an integrated SNTP server, that can synchronize the time set on the clients with the time set on the board. You can start, stop and configure the server.

WBM path:

WBM > Explorers > Basic Settings > *SNTP Settings*

Right-click *SNTP Settings* to display a menu containing the following entries:

> Display
> Edit
> Reset Time Request Counter

7.1.8.1 Display

This option allows you to display the current settings and status of the SNTP server.

WBM path:

WBM > Explorers > Basic Settings > (right-click) SNTP settings > *Display*

The *SNTP Settings* mask is displayed. For descriptions of the individual fields, see Section 7.1.8.2, "Edit".

7.1.8.2 Edit

This option allows you to edit the current settings and status of the SNTP server.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (right-click) SNTP settings > *Edit*

The *SNTP Settings* mask is displayed. You can make the following entries:

- *Start/Stop SNTP Server*: You must select this checkbox to start the SNTP server. To stop the SNTP server, clear this checkbox.

The SNTP server status is displayed for information purposes, as is the time difference to Greenwich Mean Time (UTC) and the number of timestamps sent (board time information sent on request to clients).

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.8.3 Reset Time Request Counter

This option allows you to reset the time request counter.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (right-click) SNTP settings > *Reset Time Request Counter*

The menu item "Reset Time Request Counter" can be used to set the "Number of sent time stamps" value (on the right side of the mask) to 0.

7.1.9 Port management

Port management guarantees that the port numbers and services in use are uniquely assigned. It also ensures that reserved port numbers cannot be used.

Port Management of the HG 1500 consists of a synchronization interface for managing ports of the HiPath 3000, expanded to include a local port management card.

Synchronization is performed automatically for port management in HiPath 3000 every time the system is started or rebooted. During this process, 32 gateway-relevant port definitions are transferred from the HiPath 3000 to the board. Port information is also automatically updated. This is because the HiPath 3000 must be rebooted every time the port information is changed, which in turn initiates a reboot of theHG 1500.

Board-related port information can also be added, edited and deleted directly via the WBM. The number of board-related port definitions is not limited.

WBM path:

WBM > Explorers > Basic Settings > *Port Management*

Right-click *Port Management* to display a menu containing the following entries:

> Display All Used Ports
> Displaying all downloaded ports
> Displaying all local ports
> Displaying Global Port Manager settings
> Editing Global Port Manager settings

Port Management (folder):

Double-click *Port Management* in the tree structure to manage the local port definitions. The following entry is displayed in the tree structure:

> Locally Administered Ports

7.1.9.1 Display All Used Ports

This option allows you to view the port definitions set in HiPath 3000 and those set locally on the board.

WBM path:

WBM > Explorers > Basic Settings > (right-click) Port management > *Display All Used Ports*

The *Used Ports* mask is displayed. The port number, the allocated protocol name (service), the port type, the port status (active or inactive), possible partner ports, the port availability status and the origin of the port (local or downloaded from HiPath 3000) are displayed in a table for each port.

7.1.9.2 Displaying all downloaded ports

This option allows you to display all ports defined in HiPath 3000.

WBM path:

WBM > Explorers > Basic Settings > (right-click) Port management > *Display All Downloaded Ports*

The *Downloaded Ports* mask is displayed. The port number, the allocated protocol name (service), the port type, the port status (active or inactive), possible partner ports, and the port availability status are displayed in a table for each port.

7.1.9.3 Displaying all local ports

This option allows you to display the local port definitions.

WBM path:

WBM > Explorers > Basic Settings > (right-click) Port management > *Display All Local Ports*

The *Locally Administered Ports* mask is displayed. The port number, the allocated protocol name (service), the port type, the port status (active or inactive), possible partner ports, and the port availability status are displayed in a table for each port.

7.1.9.4 Displaying Global Port Manager settings

This function can be used to display which port definitions are given priority in the case of conflict.

WBM path:

WBM > Explorers > Basic Settings > (right-click) Port management > *Display Global Port Manager Settings*

The *Global Port Manager Settings* mask is displayed. If HiPath 3000 port definitions are prioritized, *Downloaded from PBX* is displayed as the priority. If this is not the case, *Locally defined ports* is displayed.

7.1.9.5 Editing Global Port Manager settings

This option allows you to set which port definitions are given priority in the case of conflict.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (right-click) Port management > *Edit Global Port Manager Settings*

The *Global Port Manager Settings* mask is displayed. You can edit the following field:

- *Priority*: Select Downloaded from PBX if HiPath 3000 port definitions are to have priority, or Locally defined ports if the latter are to have priority. For more detailed information on locally defined ports see Section 7.1.9.6, "Locally Administered Ports".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.9.6 Locally Administered Ports

This entry allows you to add, display, edit and delete locally administered ports.

WBM path:

WBM > Explorers > Basic Settings > (double-click) Port management > *Locally Administered Ports*

Right-click *Locally Administered Ports* to display a menu containing the following entries:

> Displaying all local ports
> Adding a locally administered port

Locally Administered Ports (folder):

If you have already added locally administered ports, *Locally Administered Ports* is displayed as an expandable folder. In this case, double-click *Locally Administered Ports* in the tree structure to view the locally administered ports individually.

Right-click the individual ports to display a menu containing the following entries:

> Display Port
> Edit Port
> Delete Port

7.1.9.7 Displaying all local ports

This option allows you to display the local port definitions (same function as that described in Section 7.1.9.3).

WBM path:

WBM > Explorers > Basic Settings > (double-click) Port management > (right-click) Locally Administered Ports > *Display All Local Ports*

7.1.9.8 Adding a locally administered port

This option allows you to create new local port definitions.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (double-click) Port management > (right-click) Locally Administered Ports > *Add Locally Administered Port*

The *Add Port Settings* mask is displayed. You can edit the following fields:

- *Port Number*: Specify the port number for the service you have selected under "Port Name".
- *Port Name*: Select the service for which you are creating the local port definition.
- *Port enabled*: If this checkbox is selected, this setting is applied. If this checkbox is cleared, this setting can be stored but is not applied.

The Port Type and Peer Port are displayed for information purposes.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.9.9 Display Port

This option allows you to display details for locally administered ports on an individual basis.

WBM path:

WBM > Explorers > Basic Settings > (double-click) Port management > (double-click) Locally Administered Ports > (right-click the relevant port) *Display Port*

The *Port Settings* mask is displayed. For descriptions of the individual fields, see Section 7.1.9.8, "Adding a locally administered port".

7.1.9.10 Edit Port

This option allows you to edit the data for locally administered ports on an individual basis.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (double-click) Port management > (double-click) Locally Administered Ports > (right-click the relevant port) *Edit Port*

The *Port Settings* mask is displayed. For descriptions of the individual fields, see Section 7.1.9.8, "Adding a locally administered port".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.9.11 Delete Port

This option allows you to delete locally administered port.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (double-click) Port management > (double-click) Locally Administered Ports > (right-click the relevant port) *Delete Port*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.1.10 Online Help Directory

You can freely select the storage location for the HTML-based HG 1500 Online Help and for the WBM interface.

WBM path:

WBM > Explorers > Basic Settings > *Online Help Directory*

Right-click *Online Help Directory* to display a menu containing the following entries:

> Display Online Help Directory
> Edit Online Help Directory

7.1.10.1 Display Online Help Directory

This option allows you to view the Online Help Directory.

WBM path:

WBM > Explorers > Basic Settings > (right-click) Online Help Directory > *Display Online Help Directory.*

The *Online Help Directory* mask is displayed. After entering the Help URL, the protocol (*http://* , *https://*, *file://*) and the root directory are displayed.

7.1.10.2 Edit Online Help Directory

You can install the online help in several different ways:

- on an HTTP server or an HTTPS server (protocols http or https)
- in a directory available on the network (file server) or on the local PC (protocol file)

To do this, copy the contents of the documentation CD to the required server or PC.

> The directory structure must be maintained when copying the files.
> The directory name for the help files must always be *hipath_help*.

After you have installed the online help, you can specify the storage location.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Basic Settings > (right-click) Online Help Directory > *Edit Online Help Directory*

The *Online Help Directory* mask is displayed. You can change the following settings:

- *Protocol*: This field contains the server-specific protocol used (available options: *file://*, *http://*, *https://*).
- *Root Directory*: For the *http://* and *https://* protocols, this field contains the URL specification (without the protocol) of the directory in which the standard root directory *hipath_help* of the online help is located. For protocol file://, in the case of a local help installation the folder "hipath_help" of the online help must be enabled on the PC. The hostname or the IP address of the corresponding PC must be specified as the path in WBM. See also the examples further below.

> ⓘ When specifying a path to a Windows-based computer, make sure that you enter a simple forward slash (as usual for URLs) to separate the folders instead of a backslash.
> No forward slash should be entered at the end of the entry in the *Root Directory* field.

Examples

Type	Protocol	Host Name	Path	Entry for "Root Directory"
Web server	*http://*	*net.serv.com*	*/netadmin/doc*	*net.serv.com/netadmin/doc*
Secure Web server	*https://*	*192.168.27.13*	*/admin/doc*	*192.168.27.13/admin/doc*
LAN Drive	*file://*		*\\server1\hg3550hg1500\onlinedoku*	*\\server1/hg3550hg1500/onlinedoku*
PC Drive	*file://*	*PC name*	*C:\...\hipath_help (enabled)*	*my-admin-pc-name*

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2 Security

The security-relevant settings on HG 1500 include filters for devices and ports with access rights and access administration for managing the gateway. For increased security, the gateway allows you to switch to secure administration with SSL (administration data is encrypted for transfer) and in a further step to secure VPN mode (here too all user data transmitted via the gateway is encrypted).

WBM path:

WBM > Explorers > *Security*

The *Security* tree structure is displayed.

Entries under *Security* tree structure:

> MAC Address Filtering
> IP Address Filtering
> IP Accounting
> IP Administration Access
> VPN
> SSL

The *VPN* entry is only displayed if SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), and if WBM was activated via an HTTPS address.

7.2.1 MAC Address Filtering

MAC address filtering protects HG 1500 against unauthorized access (via an external PC, for example). Only PCs with IP addresses that are released in combination with the relevant unique MAC address via this security function are assigned access authorization. If the IP and MAC addresses do not match those of the specified combination, access is denied.

WBM path:

WBM > Explorers > Security > *MAC Address Filtering*

Right-click *MAC Address Filtering*to display a menu containing the following entries:

> Display MAC Address Filtering
> Enable MAC Address Filtering / Disable MAC Address Filtering
> Add Rule for MAC Address Filtering
> Delete all MAC Address Filtering Rules
> MAC Address Filtering Table Editor

MAC Address Filtering (folder):

If you have already added MAC address filtering rules (see Section 7.2.1.4, "Add Rule for MAC Address Filtering"), *MAC Address Filtering* is displayed as an expandable folder. In this case, double-click *MAC Address Filtering* in the tree structure to view the defined MAC filter rules. Right-click an individual filter rule to display a menu containing the following entries:

> Display Rule for MAC Address Filtering
> Edit Rule for MAC Address Filtering
> Delete MAC Address Filtering Rule
> Activate Rule / Deactivate Rule

7.2.1.1 Display MAC Address Filtering

This option allows you to check if MAC Address Filtering is activated for the LAN interface. It also display a table that contains all MAC address filtering rules defined.

WBM path:

WBM > Explorers > Security > (right-click) MAC Address Filtering > *Display MAC Address Filtering*

The *MAC Address Filtering* mask is displayed. The table contains the IP address, the MAC address and the activation status for every MAC address filtering rule.

7.2.1.2 Enable MAC Address Filtering

This option is only available if MAC address filtering rules have already been added (see Section 7.2.1.4, "Add Rule for MAC Address Filtering") and MAC Address Filtering is disabled. You can enable MAC filtering.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) MAC Address Filtering > *Enable MAC Address Filtering*

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.1.3 Disable MAC Address Filtering

This option is only available if MAC address filtering rules have already been added (see Section 7.2.1.4, "Add Rule for MAC Address Filtering") and MAC Address Filtering is enabled. You can disable MAC filtering.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) MAC Address Filtering > *Disable MAC Address Filtering*

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.1.4 Add Rule for MAC Address Filtering

This option allows you to create new rules for MAC address filtering.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) MAC Address Filtering > *Add Rule for MAC Address Filtering*

A warning is displayed. Confirm this message with *OK*.

The *Add Rule for MAC Address Filtering* mask is displayed. You can edit the following fields:

- Rule Name: Enter a unique name for the filter rule in this field.
- For PPPoE Connection: If this check box is selected, this rule applies to PPPoE connections where the IP address is irrelevant because it is assigned by the provider. The MAC address is essential for using this rule. The IP Address field is dimmed.
- *IP address*: In this field, enter the IP address from which IP packets should be accepted. Please note that the filter will only accept packets from this IP address if the MAC address also matches.
- *MAC Address*: In this field, enter the MAC address of the device from which packets should be accepted.
  If the device is connected via a router and not directly to the board, you must specify the MAC address of the router. In this case, you must create another MAC filter rule consisting of both the IP address and MAC address of the router. This process is necessary because the router exchanges MAC addresses (that is uses its own MAC address) when transporting the packets.
- *Rule activated*: If you activate this option, the filter rule just defined is immediately activated.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.1.5 Delete all MAC Address Filtering Rules

This option allows you to delete all of the rules defined for MAC address filtering at once.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) MAC Address Filtering > *Delete all MAC Address Filtering Rules*

A warning is displayed. Confirm this message with *OK*. Another message is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

> ℹ You cannot delete all of the MAC filter rules if the MAC filter is enabled. If there is only one filter rule left, it cannot be deleted. This ensures that at least one PC can continue to access the Gateway when the MAC filter is enabled.

7.2.1.6 MAC Address Filtering Table Editor

The MAC Address Filtering Table Editor allows you to edit all existing and new MAC address filtering rules at once.

WBM path:

WBM > Explorers > Security > (right-click) MAC Address Filtering > *MAC Address Filtering Table Editor*

A warning is displayed. Confirm this message with *OK*. A separate window containing the Table Editor is displayed. Each line in the table represents a MAC address filtering rule. For descriptions of the individual fields, see Section 7.2.1.4, "Add Rule for MAC Address Filtering". For information on how to use the Table Editor, see Section 3.2.5, "Table Editor".

7.2.1.7 Display Rule for MAC Address Filtering

If rules for MAC address filtering are defined, you can display detailed information on the individual filtering rules.

WBM path:

WBM > Explorers > Security > (double-click) MAC Address Filtering > (right-click) relevant rule > *Display Rule for MAC Address Filtering*

The *MAC Address Filtering Rule* mask is displayed. For descriptions of the individual fields, see Section 7.2.1.4, "Add Rule for MAC Address Filtering".

7.2.1.8 Edit Rule for MAC Address Filtering

If rules for MAC address filtering have been defined, you can edit the data for individual MAC address filtering rules.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) MAC Address Filtering > (right-click) selected rule > *Edit Rule for MAC Address Filtering*

A warning is displayed. Confirm this message with *OK*. The *MAC Address Filtering Rule* mask is displayed. For descriptions of the individual fields, see Section 7.2.1.4, "Add Rule for MAC Address Filtering".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.1.9 Delete MAC Address Filtering Rule

If rules for MAC address filtering have been defined, you can delete individual MAC address filtering rules.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) MAC Address Filtering > (right-click) selected rule > *Delete MAC Address Filtering Rule*

A warning is displayed. Confirm this message with *OK*. Another message is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

> You cannot delete all of the MAC filter rules if the MAC filter is enabled. If there is only one filter rule left, it cannot be deleted. This ensures that at least one PC can continue to access the Gateway when the MAC filter is enabled.

7.2.1.10 Activate Rule

If rules for MAC address filtering have been defined, you can activate MAC address filtering rules that are currently disabled (red icon).

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) MAC Address Filtering > (right-click) selected rule > *Activate Rule*

A warning is displayed. Confirm this message with *OK*.

7.2.1.11 Deactivate Rule

If rules for MAC address filtering have been defined, you can deactivate MAC address filtering rules that are currently activated (green icon).

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) MAC Address Filtering > (right-click) selected rule > *Deactivate Rule*

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.2 IP Address Filtering

IP Address Filtering protects HG 1500 against unauthorized access (for example via an external network or an external PC). If IP address filtering has been activated, access to the released IP addresses via an unprotected network is restricted.

> ℹ Information about the IP protocols and port numbers used in HiPath 2000 V1.0 can be found in Appendix C of the HiPath 2000 Service Manual.

WBM path:

WBM > Explorers > Security > *IP Address Filtering*

Right-click *IP Address Filtering* to display a menu containing the following entries:

> Display IP Address Filtering
> Enable IP Address Filtering / Disable IP Address Filtering
> Add Rule for IP Address Filtering
> Delete all IP Address Filtering Rules
> IP Address Filtering Table Editor

IP Address Filtering (folder):

If rules have already been added for IP address filtering, *IP Address Filtering* is displayed as an expandable folder. In this case, double-click *IP Address Filtering* in the tree structure to view the defined IP filter rules. Right-click the individual filter rules to display a menu containing the following entries:

> Display Rule for IP Address Filtering
> Edit Rule for IP Address Filtering
> Delete IP Address Filtering Rule
> Activate Rule / Deactivate Rule

7.2.2.1 Display IP Address Filtering

This option allows you to check if IP Address Filtering is activated for the LAN interface. It also displays a table that contains detailed data on every IP address filtering rule defined.

WBM path:

WBM > Explorers > Security > (right-click) IP Address Filtering > *Display IP Address Filtering*

The *IP Address Filtering* mask is displayed. The table contains detailed data on every IP address filtering rule defined (for information on the meaning of the column headings, see the relevant field descriptions under Section 7.2.2.4, "Add Rule for IP Address Filtering".

WBM path:

WBM > Explorers > Security > (right-click) MAC Address Filtering > *Display MAC Address Filtering*

7.2.2.2 Enable IP Address Filtering

This option is only available if IP address filtering rules have already been added (see Section 7.2.2.4, "Add Rule for IP Address Filtering") and IP Address Filtering is disabled. This option permits you to enable the IP Filter.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) IP Address Filtering > *Enable IP Address Filtering*

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.2.3 Disable IP Address Filtering

This option is only available if IP address filtering rules have already been added (see Section 7.2.2.4, "Add Rule for IP Address Filtering") and IP Address Filtering is enabled. This option permits you to disable the IP Filter.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) IP Address Filtering > *Disable IP Address Filtering*

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.2.4 Add Rule for IP Address Filtering

This function allows you to create new rules for IP address filtering.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) IP Address Filtering > *Add Rule for IP Address Filtering*

A warning is displayed. Confirm this message with *OK*.

The *Add Rule for IP Address Filtering* mask is displayed. You can edit the following fields:

- *Lower Limit of Source IP Address Range*: The filter rule only permits IP addresses with sender addresses that originate in a defined area. In this field, enter the lower limit of the permitted address range from which packets should be accepted.
- *Upper Limit of Source IP Address Range*: In this field, enter the upper limit of the permitted address range from which packets should be accepted.
- *Lower Limit of Destination IP Address Range*: The filter rule permits an IP range to which packets can be sent. In this field, enter the lower limit of the permitted address range to which packets should be allowed to be sent.
- *Upper Limit of Destination IP Address Range*: In this field, enter the upper limit of the permitted address range to which packets should be allowed to be sent.

> To allow packets to be sent to random IP addresses, enter `0.0.0.0` as the *Lower Limit of Destination IP Address Range* and `255.255.255.255` as the *Upper Limit of Destination IP Address Range*.
> The source and destination address ID indicates the device that set up the connection. If the HG 1500 is to be able to set up the connection, for example, then the board is the source and the remote end of the connection is the destination.
> After a connection has been successfully set up, the packets associated with this connection are transferred in both directions, even if a filter rule was only specified for one direction.

- *IP Protocol*: Specify the protocol that should be permitted (*TCP*, *UDP*, *ICMP* or *All*).
- *IP Port Number*: Enter a protocol port for the IP address range. This enables you to restrict the filter range further. If you want to permit the use of all ports, then activate "All ports permitted".
- *ICMP Type*: Enter the permitted ICMP protocol types. If you want to permit all ICMP protocol types, activate *All types permitted*.
- *ICMP Code*: Specify which ICMP codes should be permitted. If you want to permit all ICMP codes, activate "All codes permitted".

- *Rule activated*: If you activate this option, the filter rule just defined is immediately activated.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.2.5 Delete all IP Address Filtering Rules

This option allows you to delete all of the rules defined for IP address filtering at once.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) IP Address Filtering > *Delete all IP Address Filtering Rules*

A warning is displayed. Confirm this message with *OK*. Another message is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.2.6 IP Address Filtering Table Editor

The IP Address Filtering Table Editor allows you to edit all existing and new IP address filtering rules at once.

WBM path:

WBM > Explorers > Security > (right-click) IP Address Filtering > *IP Address Filtering Table Editor*

A warning is displayed. Confirm this message with *OK*. A separate window containing the Table Editor is displayed. Each line in the table represents an IP address filtering rule. For descriptions of the individual fields, see Section 7.2.2.4, "Add Rule for IP Address Filtering". For information on how to use the Table Editor, see Section 3.2.5, "Table Editor".

7.2.2.7 Display Rule for IP Address Filtering

If rules for IP address filtering have been defined, you can edit the data for the individual IP address filtering rules.

WBM path:

WBM > Explorers > Security > (double-click) IP Address Filtering > (right-click) relevant rule > *Display IP Address Filtering*

The *IP Address Filtering* mask is displayed. For descriptions of the individual fields, see Section 7.2.2.4, "Add Rule for IP Address Filtering".

7.2.2.8 Edit Rule for IP Address Filtering

If rules for IP address filtering have been defined, you can edit the data for individual IP address filtering rules.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Address Filtering > (right-click) selected rule > *Edit Rule for IP Address Filtering*

A warning is displayed. Confirm this message with *OK*. The *IP Address Filtering* mask is displayed. For descriptions of the individual fields, see Section 7.2.2.4, "Add Rule for IP Address Filtering".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.2.9 Delete IP Address Filtering Rule

If rules for IP address filtering have been defined, you can disable individual IP address filtering rules.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Address Filtering > (right-click) selected rule > *Delete IP Address Filtering Rule*

A warning is displayed. Confirm this message with *OK*. Another message is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.2.10 Activate Rule

If rules for IP address filtering have been defined, you can enable individual IP address filtering rules that are currently disabled (red icon).

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Address Filtering > (right-click) selected rule > *Activate Rule*

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.2.11 Deactivate Rule

If rules for IP address filtering have been defined, you can disable individual IP address filtering rules that are currently enabled (green icon).

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Address Filtering > (right-click) selected rule > *Deactivate Rule*

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.3 IP Accounting

The IP Accounting option is used to count bytes that are transferred via PPP, DSL and/or LAN2 interface. The "IP Accounting client" add-on software is required for this feature and must be installed on a PC.

The transferred data is counted and totalled on HG 1500. The IP Accounting client is connected to HG 1500 via the IP network and permits the data entered to be used.

You can enable and disable IP Accounting and set the login parameters.

WBM path:

WBM > Explorers > Security > *IP Accounting*

Right-click *IP Accounting* to display a menu containing the following entries:

> Display IP Accounting Parameters
> Edit IP Accounting Parameters

7.2.3.1 Display IP Accounting Parameters

You can display the settings that apply to IP Accounting.

WBM path:

WBM > Explorers > Security > (right-click) IP Accounting > *Display IP Accounting Parameters*

The *IP Accounting* mask is displayed. For descriptions of the individual fields, see Section 7.2.3.2, "Edit IP Accounting Parameters".

7.2.3.2 Edit IP Accounting Parameters

This option allows you to edit the settings that apply to IP Accounting.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) IP Accounting > *Edit IP Accounting Parameters*

The *IP Accounting* mask is displayed. You can edit the following fields:

- *User Login Name*: In the input field, enter a name to be specified by the user when logging on.
- *Login Password*: Enter a password for user identification in the input field.
- *Restrict Access to One IP Address*: Select this checkbox if the name and password specified should only be permitted for access from a single IP address. Otherwise, access is permitted from any IP address for the user identified by this name and password.

- *IP Address of IP Accounting Client*: Enter the IP address of the PC on which the "IP Accounting Client" software is installed. The entry `255.255.255.255` completely disables IP Accounting.
- *IP Accounting on LAN1-to-LAN2 Connection*: Select this checkbox if IP Accounting should also be activated for data packets to be transported between LAN1 and LAN2. If the parameter *LAN2* is not set to *LAN2* in the *Network Interfaces* menu (see Section 7.3.3, "LAN2 ([not used])"), then IP Accounting is always active.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.4 IP Administration Access

IP Administration Access specifies the IP addresses from which HG 1500 can be administered.

WBM path:

WBM > Explorers > Security > *IP Administration Access*

Right-click *IP Administration Access* to display a menu containing the following entries:

> Delete All IP Addresses for Administration

IP Administration Access (folder):

Double-click *IP Administration Access* to display the following entries:

> Telnet
> Web-based management

ⓘ If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the *Telnet* option is not available.

7.2.4.1 Telnet

Right-click *Telnet* in the tree structure under *IP Administration Access* to display a menu containing the following entries:

> Display State of Access Check
> Enable Access Check / Disable Access Check
> Add IP Address for Administration

Telnet (folder):

If IP administration addresses have already been configured (see Section 7.2.4.7, "Add IP Address for Administration"), *Telnet* is displayed as an expandable folder. In this case, double-click *Telnet* in the tree structure to view the IP administration addresses configured for Telnet access. Right-click the individual IP addresses to display a menu containing the following entries:

> Display IP Address for Administration
> Edit IP Address for Administration
> Delete IP Address for Administration

7.2.4.2 Web-based management

Right-click *Web Based Management* in the tree structure under *IP Administration Access* to display a menu containing the following entries:

> Display State of Access Check
> Enable Access Check / Disable Access Check
> Add IP Address for Administration

Web Based Management (folder):

If IP administration addresses have already been configured (see Section 7.2.4.7, "Add IP Address for Administration"), *Web Based Management* is displayed as an expandable folder, like Telnet (folder):. As for *Telnet*, double-click *Web Based Management* in the tree structure to view the IP administration addresses configured for WBM access. Right-click the individual IP addresses to display a menu containing the following entries:

> Display IP Address for Administration
> Edit IP Address for Administration
> Delete IP Address for Administration

7.2.4.3 Delete All IP Addresses for Administration

This option allows you to delete all of the configured IP administration addresses at once. You can only do this if MAC Address Filtering and IP Address Filtering are disabled (see Section 7.2.1.3, "Disable MAC Address Filtering" and Section 7.2.2.3, "Disable IP Address Filtering").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) IP Administration Access > *Delete All IP Addresses for Administration*

A message appears. Click *Delete*, and *OK* in the subsequent confirmation mask.

7.2.4.4 Display State of Access Check

This option allows you to display an overview of all IP administration address access rights.

WBM path for WBM access:

WBM > Explorers > Security > (double-click) IP Administration Access > (right-click) Web-based management > *Display State of Access Check*

WBM path for Telnet access:

WBM > Explorers > Security > (double-click) IP Administration Access > (right-click) Telnet > *Display State of Access Check*

> ℹ If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the Telnet option is not available.

The *IP Administration Access* mask is displayed. This window specifies if Access Check is enabled for WBM or Telnet access (depending on your selection). Each IP address is listed in the table below. This table also displays if the WBM or the Telnet Access Check is enabled for the respective IP address.

7.2.4.5 Enable Access Check

If IP administration addresses have already been configured (see Section 7.2.4.7, "Add IP Address for Administration"), you can enable the access check for permitted IP addresses.

WBM path for WBM access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (right-click) Web-based management > *Enable Access Check*

WBM path for Telnet access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (right-click) Telnet > *Enable Access Check*

If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the Telnet option is not available.

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.4.6 Disable Access Check

If IP administration addresses have already been configured (see Section 7.2.4.7, "Add IP Address for Administration"), you can disable the access check for permitted IP addresses.

WBM path for WBM access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (right-click) Web-based management > *Disable Access Check*

WBM path for Telnet access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (right-click) Telnet > *Disable Access Check*

If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the Telnet option is not available.

A warning is displayed. Confirm this message with *OK* (save the new configuration status permanently with the Save icon in the control area).

7.2.4.7 Add IP Address for Administration

You can configure new IP addresses for administration access to HiPath HG 1500. These addresses can be configured separately depending on whether WBM or Telnet access is selected.

WBM path for WBM access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (right-click) Web-based management > *Add IP Address for Administration*

WBM path for Telnet access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (right-click) Telnet > *Add IP Address for Administration*

> If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the Telnet option is not available.

The *Add IP Address for Administration* mask is displayed. You can edit the following fields:

- *Permitted IP Address*: Enter the IP address to which you want to assign Telnet or WBM access rights. You must enter `0` if you want to permit access for all subscribers in a network (for example enter `192.1.13.0` for the network 192.1.13.x).
- *Web-Based Management Access*: Select this checkbox if WBM access should be permitted from the specified address.
- *Telnet Access*: This field is available if SSL is disabled. Select this checkbox if Telnet access should be permitted from the specified address.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.4.8 Display IP Address for Administration

You can check the access option available for administering the HiPath HG 1500 for each IP administration address.

WBM path for WBM access:

WBM > Explorers > Security > (double-click) IP Administration Access > (double-click) Web-based management > (right-click) relevant IP address > *Display IP Address for Administration*

WBM path for Telnet access:

WBM > Explorers > Security > (double-click) IP Administration Access > (double-click) Telnet > (right-click) relevant IP address > *Display IP Address for Administration*

> If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the Telnet option is not available.

The *IP Address for Administration* mask is displayed. This mask displays the access rights assigned to the IP address for board administration via WBM or Telnet.

7.2.4.9 Edit IP Address for Administration

This option allows you to edit the settings for existing IP administration addresses.

WBM path for WBM access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (double-click) Web-based management > (right-click) selected IP address > *Edit IP Address for Administration*

WBM path for Telnet access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (double-click) Telnet > (right-click) selected IP address > *Edit IP Address for Administration*

> If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the Telnet option is not available.

The *IP Address for Administration* mask is displayed. For descriptions of the individual fields, see Section 7.2.4.7, "Add IP Address for Administration".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.4.10 Delete IP Address for Administration

This option allows you to delete existing IP administration addresses.

WBM path for WBM access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (double-click) Web-based management > (right-click) selected IP address > *Delete IP Address for Administration*

WBM path for Telnet access:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) IP Administration Access > (double-click) Telnet > (right-click) selected IP address > *Delete IP Address for Administration*

> ⓘ If SSL is enabled (see Section 7.2.6.1, "Initial Configuration and Activation of SSL"), the Telnet option is not available.

A message appears. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5 VPN

Virtual Private Networks (VPN) enable you to use public networks, in particular the Internet, as closed, company-internal networks. Data traffic in a VPN is protected against tapping and alteration by third parties.

VPNs can only be used if you have acquired the relevant licenses and have entered the valid license keys for them (see Section 7.1.3.1, "Display Licenses").

Background information:

See Section 9.6, "SSL and VPN"

> ⓘ Familiarity with Virtual Private Networks (VPN) is required for operating VPNs. Details on VPN terms, systems and procedures are not included in the scope of this manual. Refer to the relevant technical literature if you require detailed information on these topics.

WBM path:

WBM > Explorers > Security > *VPN*

A menu containing the following entries is displayed when you right-click *VPN*.

> Display General Information
> Activate the Configured VPN Tables
> IPsec on/IPsec off
> Reset to insecure mode

VPN is displayed as an expandable folder. If IPsec is active (see Section 7.2.5.3, "IPsec on/IPsec off"), the color of the folder icon is green; if IPsec is not active, the icon is red. Double-click *VPN* in the tree structure to display the following entries:

> Lightweight CA
> Certificate Management
> Services
> Tunnels
> Rules
> Public Key Infrastructure (PKI)#

The following steps explain how to configure the VPN and hence the secure mode.

1. Switch to secure administration (SSL) if this has not yet been done. For more information, see Section 7.2.6.1, "Initial Configuration and Activation of SSL".
2. Generate or import the necessary certificates for authentication with digital signatures. For more information, see Section 7.2.6.3, "Certificate Generation" and Section 7.2.6.11, "Certificate Management".

3. Configure the first tunnel for automatic key exchange with the IKE protocol. For more information, see Section 7.2.5.53, "Adding tunnels".
4. Specify the key exchange data for the tunnel. You must enter a password for authentication using pre-shared keys. For authentication using digital signatures, you must select at least one CA certificate.
5. Configure the services that are to be used by the rules. For more information, see Section 7.2.5.40, "Configured Services".
6. Configure the "pass" rules with the necessary encryption for payload transfer (once for inbound direction, once for outbound direction (see Section 7.2.5.64, "Adding rules"). Configure a "pass" rule without encryption that allows you to administer the Administration PC over WBM.
7. Activate the configured tables. For more information, see Section 7.2.5.2, "Activate the Configured VPN Tables".
8. Configure the relevant tunnel at the opposite tunnel endpoint. For more information, see Section 7.2.5.53, "Adding tunnels".
9. Enable the *IPsec* function in the *Security* Explorer. For more information, see Section 7.2.5.3, "IPsec on/IPsec off".

7.2.5.1 Display General Information

You can view general information on the components used for IPsec.

WBM path:

WBM > Explorers > Security > (right-click) VPN > *Display General Information*

The *IPsec General Information* mask is displayed. The encryption algorithms that can be used, the algorithms for checking data integrity (to detect data manipulation), public key algorithms and Diffie-Hellman Groups are listed.

7.2.5.2 Activate the Configured VPN Tables

You can activate all previously configured VPN tables for certificates, services, rules, and tunnels:

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) VPN > *Activate the Configured VPN Tables*

Please read the important message displayed.

Click *Activate Now* followed by *OK* in the confirmation mask. The configuration is enabled.

7.2.5.3 IPsec on/IPsec off

You can activate and deactivate the entire VPN functionality. If the *VPN* folder icon is red, VPN is off and the *IPsec on* option is displayed. If the *VPN* folder icon is green, IPsec is off and the *IPsec off* option is displayed.

> You must set at least one "pass" rule between your administration computer's IP addresses and the HG 1500 before you activate the IPsec function (see Section 7.2.5.64, "Adding rules"). Otherwise, you cannot access the gateway with WBM after activation because there is not a single "pass" rule defined in factory mode.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) VPN > *IPsec on*

or:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) VPN > *IPsec off*

A message appears.

Click *Activate IPsec* or *Deactivate IPsec* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *VPN* folder icon changes color depending on the setting.

7.2.5.4 Reset to insecure mode

You can deactivate all VPN and SSL functions.

All security-specific data (for example, all certificates and services and rules which you created yourself) is deleted when you disable the VPN and SSL functions and revert to insecure mode. If you did not save this data previously (see Section 6.1.2.1, "Load from Gateway"), then you will need to create it again when you later revert to secure mode.

If you deactivate the VPN and SSL functions, the system reverts to the HTTP protocol. The Internet Explorer – which communicates via HTTPS in secure mode – immediately loses access to the gateway. The connection must be reestablished over the Explorer address bar. Use the HTTP protocol and port 8085 to do this.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) VPN > *Reset to insecure mode*

A warning is displayed.

If you are sure that you want to delete all of the VPN and SSL data, click *Activate Now* followed by *OK* in the confirmation mask. The board initiates an automatic restart. Reopen the WBM over HTTP.

7.2.5.5 Lightweight CA

Lightweight CA is a licensed function for generating and administering CA and peer certificates.

Background information:

See Section 9.6.2, "Certificates"

WBM path:

WBM > Explorers > Security > (double-click) VPN > *Lightweight CA*

A menu containing the following entry is displayed when you right-click *Lightweight CA*.

> Generating CA certificates

Lightweight CA (folder):

If you have already generated CA certificates (see Section 7.2.5.6, "Generating CA certificates"), *Lightweight CA* is displayed in the tree structure as an expandable folder. In this case, double-click *Lightweight CA* in the tree structure to view CA certificates. Right-click the individual CA certificates to display a menu containing the following entries:

> View Certificate
> Delete Certificate
> Export Certificate [X.509]
> Generating CA-signed peer certificates [PKCS#12]
> Updating CA-signed peer certificates [X.509]
> Generating Certificate Revocation Lists (CRLs)

7.2.5.6 Generating CA certificates

You can create a new CA certificate.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (right-click) Lightweight CA > *Generate CA Certificate*

The *Generate self-signed IPsec CA Certificate* mask is displayed. You can edit the following fields:

- *Certificate Name*: This field contains the certificate name. Enter a character string.

- *Serial Number of Certificate*: Enter a serial number that you defined in this field. This number must be a positive integer.
- *Type of Signature Algorithm*: Select the signature algorithm to be used for this certificate (you can choose between *dsaSHA1*, *md5RSA*, and *sha1RSA*).
- *Public key length:* Select the length of the public key used for this certificate (you can choose between *768*, *1024*, *1536* and *2048*).
- *Start Time of Validity Period (GMT)*: Enter the start time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *End Time of Validity Period (GMT)*: Enter the end time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *Subject Name*: Specify the name of the subject who requested the certificate according to the conventions of the X.509 standard (for example, enter `DE` for Germany in the *"Country (C):"* field).
- *Subject Alternative Name*: This optional information distinguishes between the *Distinguished Name Format* (such as the data under *Subject Name*) and *Other Format* (for example, the IP address entry). The input mask is dependent on the selected format.
- *CRL Distribution Point*: In this field, you can enter a URL to specify the location from which certificate revocation lists (CRL) are to be distributed.

When all settings are complete, click *Generate Certificate* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

You must activate the configuration for the changes to become effective in the configuration – see Section 7.2.5.2, "Activate the Configured VPN Tables".

7.2.5.7 View Certificate

You can view a generated CA certificate (see Section 7.2.5.6, "Generating CA certificates").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Lightweight CA > (right-click) selected certificate > *View Certificate*

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.5.6, "Generating CA certificates".

7.2.5.8 Delete Certificate

You can delete a generated CA certificate (see Section 7.2.5.6, "Generating CA certificates").

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Lightweight CA > (right-click) selected certificate > *Delete Certificate*

A warning appears. The name of the certificate is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

You must activate the configuration for the changes to become effective in the configuration – see Section 7.2.5.2, "Activate the Configured VPN Tables".

7.2.5.9 Export Certificate [X.509]

You can export a generated CA certificate (see Section 7.2.5.6, "Generating CA certificates").

X.509 is a standard for certificates. The name and the digital signature of the person who issued the certificate are also saved in the certificate. X.509 is part of the X.500 directory service for world-wide, distributed, and open systems.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Lightweight CA > (right-click) selected certificate > *Export Certificate [X.509]*

The Web browser displays a mask that lets you save the file under a random name and in a random location. The certificate name is used for the file name.

7.2.5.10 Generating CA-signed peer certificates [PKCS#12]

You can generate a CA-signed peer certificate based on a CA certificate. This is only possible if you have already generated at least one CA certificate (see Section 7.2.5.6, "Generating CA certificates"). The certificate generated is saved in a PKCS#12 file.

PKCS#12 files (PKCS#12 stands for "Personal Information Exchange Syntax Standard") save certificates with the private key. A PKCS#12 file therefore contains the necessary data for personal encryption and decryption.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Lightweight CA > (right-click) selected certificate > *Generate CA-Signed Peer Certificate [PKCS#12]*

The *Generate IPsec Peer Certificate* mask is displayed. You can edit the following fields:

- *Passphrase for encryption*: Enter a password that you have defined (with at least seven characters) in this field. This password is requested if you want to import or view a PKCS#12 file.
- *Reenter Passphrase for encryption*: Repeat the password specified above in this field.
- *Serial Number of Certificate*: Enter a serial number that you defined in this field. The number must be a positive integer.

> A serial number that is used once may not be used for another certificate as the serial number must be unique for every certificate that is created.

The other fields are the same as those available when generating a CA certificate (see Section 7.2.5.6, "Generating CA certificates").

When all settings are complete, click *Generate Certificate*. The Web browser displays a mask that lets you save the certificate file under a random name and in a random location. The certificate name is used for the file name. Enter `.p12` as the file extension.

You must activate the configuration for the changes to become effective in the configuration – see Section 7.2.5.2, "Activate the Configured VPN Tables".

7.2.5.11 Updating CA-signed peer certificates [X.509]

You can extend the period of validity of a CA-signed peer certificate: This is only possible if you have already saved a CA-signed server certificate as PKCS#12 file (see Section 7.2.5.10, "Generating CA-signed peer certificates [PKCS#12]").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Lightweight CA > (right-click) selected certificate > *Update CA-Signed Peer Certificate [X.509]*

The *Update Ipsec Peer Certificate* mask is displayed. You can edit the following fields:

- *Serial Number of Certificate*: Enter a serial number that you defined in this field. The number must be a positive integer.
- *Certificate to be Updated*: Enter the path and the file name of the certificate to be updated. Click *Browse...* to open a dialog to search for the certificate.
- *Start Time of Validity Period (GMT)*: Enter the start time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *End Time of Validity Period (GMT)*: Enter the end time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).

When all settings are complete, click *Generate Certificate*. The Web browser displays a mask that lets you save the certificate file under a random name and in a random location. The certificate name is used for the file name.

You must activate the configuration for the changes to become effective in the configuration – see Section 7.2.5.2, "Activate the Configured VPN Tables".

7.2.5.12 Generating Certificate Revocation Lists (CRLs)

You can manage a list of revoked certificates and set the revocation duration.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Lightweight CA > (right-click) selected certificate > *Generate Certificate Revocation List (CRL)*

The *Generate Certificate Revocation List (CRL)* mask is displayed.

Click *Add Certificate to List* to add a certificate to the list of certificates to be revoked.
Click *Delete Selected Certificates from List* to remove the selected lines from the list of certificates to be revoked. You can mark lines by activating the checkbox in front of the line.

You can edit the following fields:

- *Timestamp of this CRL Update*: In this fields, enter the modification timestamp for the certificate revocation list.
- *Timestamp of next CRL Update*: In this field, enter the latest time at which the certificate revocation list will become invalid and have to be replaced by a new certificate revocation list.
- *List of the Certificates to be Revoked*: In these fields, enter the time at which each certificate should be revoked. You should also select a reason for revocation. For example, *Key Compromise* if the key has been revealed to anyone other than its owner.

When all settings are complete, click *Generate Certificate Revocation List (CRL)*. The Web browser displays a mask that lets you save the certificate revocation list as a file under a random name and in a random location. The certificate name used to activate the function is entered as the default file name.

You must activate the configuration for the changes to become effective in the configuration – see Section 7.2.5.2, "Activate the Configured VPN Tables".

7.2.5.13 Certificate Management

This option allows you to manage trusted CA certificates and server certificates.

Background information:

See Section 9.6.2, "Certificates"

WBM path:

WBM > Explorers > Security > (double-click) SSL > *Certificate Management*

Right-click *Certificate Management* to display a menu containing the following entry:

> View Certificate From File

The following entries are listed under *Certificate Management*.

> Trusted CA Certificates
> Peer Certificates

7.2.5.14 View Certificate From File

If you have saved certificates in files, you can read and view the certificate data from the relevant file.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (right-click) Certificate Management > *View Certificate From File*

The *Display Certificate* mask is displayed. You must fill out the following fields to view certificate data from a file:

- *PKCS#12 Format*: You must activate this field if the certificate is saved in a PKCS#12 file.
- *Passphrase for decryption*: If you activate the *PKCS#12 Format* field, you must enter the same password here as used for file creation.
- *File with Certificate*: Enter the path and the file name of the certificate in this field. Click *Browse...* if you are unsure of the storage location. A search dialog is displayed.

Click *View Certificate*.

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.5.6, "Generating CA certificates".

7.2.5.15 Trusted CA Certificates

This option allows you to manage trusted CA certificates.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > *Trusted CA Certificates*

Double-click *Trusted CA Certificates* in the tree structure to display the following entries:

> Active Certificates
> Configured Certificates

You can use the *Active Certificates* function to view which certificates are active and which settings these certificates have.

Use the *Configured Certificates* function to import certificates and administer imported certificates.

7.2.5.16 Active Certificates

Active certificates are trusted CA certificates that were activated by activating the configuration – see Section 7.2.5.2, "Activate the Configured VPN Tables".

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > *Active Certificates*

If *Active Certificates* is not displayed as a folder icon no functions are available.

Active Certificates (folder):

If configured certificates (see Section 7.2.5.19, "Configured Certificates") were activated by activating the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables"), *Active Certificates* is displayed as the folder icon. In this case, double-click *Active Certificates* in the tree structure to view imported trusted CA certificates. Right-click the individual CA certificates to display a menu containing the following entries:

> View Certificate
> Display CRL

7.2.5.17 View Certificate

You can view an activated trusted CA certificate. This is only possible if you have already generated at least one trusted CA certificate (see Section 7.2.5.20, "Importing trusted CA certificates [X.509]") and activated the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (double-click) Active Certificates > (right-click) selected certificate > *Display Certificate*

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.5.6, "Generating CA certificates".

7.2.5.18 Display CRL

You can display the certification revocation list for an activated trusted CA certificate. This is only possible if you have already generated at least one trusted CA certificate (see Section 7.2.5.20, "Importing trusted CA certificates [X.509]") and activated the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (double-click) Active Certificates > (right-click) selected certificate > *Display CRL*

The *Certificate Revocation List Information* mask is displayed. This shows the name of the certificate revocation list, signature algorithm used, time of the CRL update and information on who issued the certificate. The list of certificates to be revoked contains the serial number, timestamp and revocation reason for each certificate.

7.2.5.19 Configured Certificates

Configured certificates are imported trusted CA certificates that only become effective when activated (see also Section 7.2.5.2, "Activate the Configured VPN Tables" and Section 7.2.5.16, "Active Certificates").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > *Configured Certificates*

Right-click *Configured Certificates* to display a menu containing the following entry:

> Importing trusted CA certificates [X.509]

Configured Certificates (folder):

If you have already imported trusted CA certificates (see Section 7.2.6.14, "Importing trusted CA certificates [X.509]"), *Configured Certificates* is displayed in the tree structure as an expandable folder. If this is the case, double-click *Configured Certificates* in the tree structure to view imported CA certificates. Right-click the individual CA certificates to display a menu containing the following entries:

> View Certificate
> Delete Certificate
> Displaying the CRL
> Importing a CRL

7.2.5.20 Importing trusted CA certificates [X.509]

You can import a CA certificate created in the course of VPN certificate generation (see Section 7.2.5.6, "Generating CA certificates").

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (right-click) Configured Certificates > *Import Trusted CA Certificate [X.509]*

The *Import IPsec CA Certificate* mask is displayed. You can edit the following fields:

- *Certificate Name*: In this field, specify the name of the certificate.
- *File with Certificate*: Enter the path and the file name of the certificate to be imported. Click *Browse...* to open a dialog to search for the certificate.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.2.5.21 View Certificate

You can view a configured trusted CA certificate. This is only possible if you have already imported at least one trusted CA certificate (see Section 7.2.5.20, "Importing trusted CA certificates [X.509]").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (double-click) Configured Certificates > (right-click) selected certificate > *Display Certificate*

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.5.6, "Generating CA certificates".

7.2.5.22 Delete Certificate

You can delete a configured trusted CA certificate. This is only possible if you have already imported at least one trusted CA certificate (see Section 7.2.5.20, "Importing trusted CA certificates [X.509]").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (double-click) Configured Certificates > (right-click) selected certificate > *Delete Certificate*

A warning appears. The name of the certificate is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5.23 Displaying the CRL

You can display the certification revocation list for a configured trusted CA certificate. This is only possible if you have already imported at least one trusted CA certificate (see Section 7.2.5.20, "Importing trusted CA certificates [X.509]").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (double-click) Configured Certificates > (right-click) selected certificate > *Display CRL*

The *Certificate Revocation List Information* mask is displayed. This shows the name of the certificate revocation list, signature algorithm used, time of the CRL update and information on who issued the certificate. The list of certificates to be revoked contains the serial number, timestamp and revocation reason for each certificate.

7.2.5.24 Importing a CRL

You can import a certificate revocation list for a configured trusted CA certificate. This is only possible if you have already imported at least one trusted CA certificate (see Section 7.2.5.20, "Importing trusted CA certificates [X.509]").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (double-click) Configured Certificates > (right-click) selected certificate > *Import CRL*

The *Import IPsec CRL* mask is displayed. This shows the name of the certificate to which the revocation list should be imported. You can edit the following field:

- *File with CRL*: Enter the path and the file name of the file which contains the revocation lists to be imported. Click *Browse...* to open a dialog to search for the file.

When all settings are complete, click *Import CRL from File* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5.25 Peer Certificates

You can use the "Peer Certificates" function to generate, display and delete Certificate Signing Requests (CSR). You can also import information files in "PKCS#12" format.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > *Peer Certificates*

Right-click *Peer Certificates* to display a menu containing the following entries:

> Generating a Certificate Signing Request (CSR)
> Importing peer certificates [PKCS#12]

Peer Certificates (folder):

If you have already generated certificate signing requests (see Section 7.2.5.26, "Generating a Certificate Signing Request (CSR)") or imported peer certificates (see Section 7.2.5.27, "Importing peer certificates [PKCS#12]"), *Peer Certificates* is displayed as a folder in the tree structure. Double-click *Peer Certificates* in the tree structure to open the individual peer certificates and certificate signing requests.

Peer Certificates:

Right-click an individual peer certificate to display a menu containing the following entries:

> View Certificate
> Delete Certificate
> Export Certificate [X.509]
> Import Updated Certificate [X.509]

Certificate Signing Requests (CSR):

Right-click an individual certificate signing request (CSR) (yellow icon) to display a menu containing the following entries:

> Display Certificate Signing Request (CSR)
> Deleting a Certificate Signing Request (CSR)
> Exporting a Certificate Signing Requests (CSR)
> Import Certificate for CSR [X.509]

7.2.5.26 Generating a Certificate Signing Request (CSR)

A certificate signing request (CSR) can be sent to a CA to demand a certificate. You can generate a certificate signing request.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (right-click) Peer Certificates > *Generate Certificate Signing Request (CSR)*

The *Generate IPsec Certificate Signing Request* mask is displayed. You can edit the following fields:

- *Certificate Request Name*: This field contains the name of the certificate signing request. Enter a character string in this field.
- *Type of Signature Algorithm*: Select the signature algorithm to be used for this certificate (you can choose between *md5RSA* and *sha1RSA*).
- *Public key length*: Select the length of the public key used for this certificate (you can choose between *768*, *1024*, *1536* and *2048*).
- *Subject Name*: Specify the name of the subject who requested the certificate according to the conventions of the X.509 standard (for example, enter DE for Germany in the "Country (C):*" field)."* DE for Germany).
- *Subject Alternative Name*: This optional information distinguishes between the "Distinguished Name Format" (such as, the data under "Subject Name") and "Other Format" (for example, the IP address entry). The input mask is dependent on the selected format.

When all settings are complete, click*Generate CSR* (save the new configuration status permanently with the Save icon in the control area). A certificate signing request is generated. The CSR and the associated private keys are saved in the folder for server certificates. The private key is not visible. CSRs are displayed in yellow.

7.2.5.27 Importing peer certificates [PKCS#12]

A PKCS#12 file contains the data for a certificate and the associated private key. You can import the relevant PKCS#12 file to use this certificate.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (right-click) Peer Certificates > *Import Peer Certificate [PKCS#12]*

The *Import IPsec Certificate* mask is displayed. You can edit the following fields:

- *Certificate Name*: In this field, specify the name of the certificate.
- *Passphrase for decryption*: In this field, enter the password which was used for creating the PKCS#12 file.
- *File with Certificate*: Specify the path and name of the file which contains the certificate data to be imported. Click *Browse...* to open a dialog to search for the file.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.2.5.28 View Certificate

You can view a peer certificate.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate > *Display Certificate*

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.5.6, "Generating CA certificates".

7.2.5.29 Delete Certificate

You can delete a peer certificate.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate > *Delete Certificate*

A warning appears. The name of the certificate is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5.30 Export Certificate [X.509]

You can export a peer certificate to a file.

X.509 is a standard for certificates. The name and the digital signature of the person who issued the certificate are also saved in the certificate. X.509 is part of the X.500 directory service for world-wide, distributed, and open systems.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate > *Export Certificate [X.509]*

The Web browser displays a mask that lets you save the file under a random name and in a random location. The certificate name is used for the file name.

7.2.5.31 Import Updated Certificate [X.509]

You can import the file associated with an updated peer certificate into an existing peer certificate (see also Section 7.2.5.11, "Updating CA-signed peer certificates [X.509]").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate > *Import Updated Certificate [X.509]*

The *Import IPsec Certificate* mask is displayed. The name of the import-destination certificate is displayed for verification purposes. You can edit the following field:

- *File with Certificate*: Specify the path and name of the file which contains the certificate data to be imported. Click *Browse...* to open a dialog to search for the file.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.2.5.32 Display Certificate Signing Request (CSR)

You can view the data for a generated certificate signing request (see Section 7.2.5.26, "Generating a Certificate Signing Request (CSR)").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate signing request (yellow icon) > *Display Certificate Signing Request (CSR)*

The *Certificate Signing Request Information* mask is displayed. This mask provides information on the name of the CSR, the subject name and encryption. The public key used and the fingerprint are displayed in hexadecimal format.

7.2.5.33 Deleting a Certificate Signing Request (CSR)

You can delete the data for a generated certificate signing request (see Section 7.2.5.26, "Generating a Certificate Signing Request (CSR)").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate signing request (yellow icon) > *Delete Certificate Signing Request (CSR)*

A warning appears. The name of the certificate signing request is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5.34 Exporting a Certificate Signing Requests (CSR)

You can export the data for a generated certificate signing request to another file (see Section 7.2.5.26, "Generating a Certificate Signing Request (CSR)").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate signing request (yellow icon) > *Export Certificate Signing Request (CSR)*

An operating system download dialog is displayed. Save the file under a random name and in a random location.

7.2.5.35 Import Certificate for CSR [X.509]

You can import certificates in which the public key matches the CSR's private key. A certificate signing request must be generated for this (see Section 7.2.5.26, "Generating a Certificate Signing Request (CSR)").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Certificate Management > (double-click) Peer Certificates > (right-click) selected certificate signing request (yellow icon) > *Import Certificate for CSR [X.509]*

The *Import IPsec Certificate* mask is displayed. You can edit the following field:

- *File with Certificate*: Specify the path and name of the file that contains the certificate data to be imported. Click *Browse...* to open a dialog to search for the file.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.2.5.36 Services

You can define services for the rules (see Section 7.2.5.58, "Rules"). You can use the rules to define how a specific service should treat IP packets ("pass", "deny", encryption). You can define services via the fields Source Port, Destination Port and IP Protocol.

Background information:

See Section 9.6.4, "Services"

WBM path:

WBM > Explorers > Security > (double-click) VPN > *Services*

Double-click *Services* in the tree structure to display the following entries:

> Active Services
> Configured Services

You can use the *Active Services* function to view which services are active and which settings are enabled for these services.

You can use the *Configured Services* function to configure or edit services or delete services which you configured yourself.

7.2.5.37 Active Services

Active services become configured services when the configuration is enabled – see Section 7.2.5.2, "Activate the Configured VPN Tables".

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Services > *Active Services*

Right-click *Active Services* to display a menu containing the following entry:

> Display IPsec Services

Active Services (folder):

If configured services (see Section 7.2.5.40, "Configured Services") were activated by activating the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables"), *Active Services* is displayed as the folder icon. In this case, double-click *Active Services* in the tree structure to view the activated services. Right-click an individual service to display a menu containing the following entry:

> Display IPsec Service

7.2.5.38 Display IPsec Services

You can view a list of all active services containing detailed information in a table.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Services > (right-click) Active Services > *Display IPsec Services*

The *Active IPsec/PKI-Based Services* mask is displayed. Each line in the table shown represents an active service. For descriptions of the individual columns, see Section 7.2.5.42, "Adding IPsec service". The relevant "pass" and "deny" rules are also displayed for each service. The assignment of rules and services is performed under Rules (see Section 7.2.5.64, "Adding rules").

7.2.5.39 Display IPsec Service

This option allows you to display details on an active service. This is only possible if you have already configured a service (see Section 7.2.5.42, "Adding IPsec service") and activated the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Services > (double-click) Active Services > (right-click) selected service > *Display IPsec Service*

The *Active IPsec/PKI-Based Services* mask is displayed. For descriptions of the individual fields, see Section 7.2.5.42, "Adding IPsec service". The relevant "pass" and "deny" rules are also displayed for each service. The assignment of rules and services is performed under Rules (see Section 7.2.5.64, "Adding rules").

7.2.5.40 Configured Services

You can use the *Configured Services* function to manage services. Configured services only become activated services (see Section 7.2.5.37, "Active Services") after activation (see Section 7.2.5.2, "Activate the Configured VPN Tables").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Services > *Configured Services*

Right-click *Configured Services* to display a menu containing the following entries:

> Display IPsec Services
> Adding IPsec service

Configured Services (folder):

If services have already been added (see Section 7.2.5.42, "Adding IPsec service"), *Configured Services* is displayed as a folder icon. In this case, double-click *Configured Services* in the tree structure to view the defined services.
Configured services that have already been activated (see Section 7.2.5.2, "Activate the Configured VPN Tables") are indicated by a dark and struck-through bullet. Services that have not yet been activated are marked by a bright bullet.
Right-click an individual service to display a menu containing the following entry:

> Display IPsec Service
> Rename IPsec Service
> Edit IPsec Service
> Delete IPsec Service

7.2.5.41 Display IPsec Services

You can view a table listing detailed information for all configured services.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Services > (right-click) Configured Services > *Display IPsec Services*

The *Configured IPsec/PKI-Based Services* mask is displayed. Each line in the table shown represents an active service. For descriptions of the individual columns, see Section 7.2.5.42, "Adding IPsec service". The relevant "pass" and "deny" rules are also displayed for each service. The assignment of rules and services is performed under Rules (see Section 7.2.5.64, "Adding rules").

7.2.5.42 Adding IPsec service

You can add a new service for IPsec.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Services > (right-click) Configured Services > *Add IPsec Service*

The *Add Configured IPsec/PKI-Based Service* mask is displayed. You can edit the following fields:

- *Name of the Service*: This field contains the name of the newly configured service. Enter a character string in this field.
- *Source Port*: Enter the number of the port which is to be used for transferring data to the transmit side. In this field, "0" indicates any (unknown) port.

- *Destination Port*: Enter the number of the port which is to be used for transferring data to the receive side. In this field, "0" indicates any (unknown) port.
- *IP Protocol*: Select the IP protocol to be used for transfer (you can choose between *All Protocol Types*, *ICMP*, *TCP* and *UDP*).

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Edit IPsec Service* mask is displayed.

7.2.5.43 Display IPsec Service

This option allows you to display details on a configured service. This is only possible if you have already configured a service (see Section 7.2.5.42, "Adding IPsec service").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Services > (double-click) Configured Services > (right-click) selected service > *Display IPsec Service*

The *Configured IPsec/PKI-Based Service* mask is displayed. For descriptions of the individual fields, see Section 7.2.5.42, "Adding IPsec service". The relevant "pass" and "deny" rules are also displayed for each service. The assignment of rules and services is performed under Rules (see Section 7.2.5.64, "Adding rules").

7.2.5.44 Rename IPsec Service

You can change the name of a configured service (see Section 7.2.5.42, "Adding IPsec service"). All other service-specific data remains unchanged.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Services > (double-click) Configured Services > (right-click) selected service > *Rename IPsec Service*

The *Configured IPsec/PKI-Based Service* mask is displayed. You can edit the following field:

- *Name of the Service*: Change the name of the service in this field.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The renaming mask remains visible.

7.2.5.45 Edit IPsec Service

This option allows you to display details on a configured service. This is only possible if you have already configured a service (see Section 7.2.5.42, "Adding IPsec service") but not yet activated it (bright bullet).

> If you want to edit an activated service, you must delete it first (see Section 7.2.5.46, "Delete IPsec Service"). Then create a new IPsec service.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Services > (double-click) Configured Services > (right-click) selected service > *Edit IPsec Service*

The *Configured IPsec/PKI-Based Service* mask is displayed. For descriptions of the individual fields, see Section 7.2.5.42, "Adding IPsec service".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Edit IPsec Service* mask remains visible.

7.2.5.46 Delete IPsec Service

You can delete a configured service (see Section 7.2.5.42, "Adding IPsec service").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Services > (double-click) Configured Services > (right-click) selected service > *Delete IPsec Service*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5.47 Tunnels

Tunnel is the term used to describe the transportation of encrypted data packets to a defined endpoint.

Background information:

See Section 9.6.3, "IPsec Tunnel"

WBM path:

WBM > Explorers > Security > (double-click) VPN > *Tunnels*

Double-click *Tunnels* in the tree structure to display the following entries:

> Active Tunnels
> Configured Tunnels

You can use the *Active Tunnels* function to view which services are active and which settings are enabled for these services.

You can use the *Configured Tunnels* function to configure, edit, and delete tunnels.

7.2.5.48 Active Tunnels

Active tunnels become configured tunnels when the configuration is enabled – see Section 7.2.5.2, "Activate the Configured VPN Tables".

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Tunnels > *Active Tunnels*

Right-click *Active Tunnels* to display a menu containing the following entry:

> Displaying general tunnel data

Active Tunnels (folder):

If configured tunnels (see Section 7.2.5.51, "Configured Tunnels") were activated by activating the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables"), *Active Tunnels* is displayed as a folder icon. In this case, double-click *Active Tunnels* in the tree structure to view the activated tunnels. Right-click an individual tunnel to display a menu containing the following entries:

> Displaying tunnel data

7.2.5.49 Displaying general tunnel data

You can view a list of all active tunnels containing detailed information in a table.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (right-click) Active Tunnels > *Display General Tunnel Data*

The *Active IPsec Tunnels* mask is displayed. Each line in the table shown represents an active tunnel. For descriptions of the individual columns, see Section 7.2.5.53, "Adding tunnels". The relevant transmit and receive rules are also displayed for each service.

7.2.5.50 Displaying tunnel data

This option allows you to display details on an active tunnel. This is only possible if you have already configured a tunnel (see Section 7.2.5.53, "Adding tunnels") and activated the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (double-click) Active Tunnels > (right-click) selected tunnel > *Display Tunnel Data*

The *Active IPsec Tunnels* mask is displayed. For descriptions of the individual fields, see Section 7.2.5.53, "Adding tunnels". The relevant transmit and receive rules are also displayed for each service.

7.2.5.51 Configured Tunnels

You can use the *Configured Tunnels* function to manage tunnels. Configured tunnels only become activated tunnels (see Section 7.2.5.2, "Activate the Configured VPN Tables") after activation (see Section 7.2.5.48, "Active Tunnels").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Tunnels > *Configured Tunnels*

Right-click *Configured Tunnels* to display a menu containing the following entries:

> Displaying general tunnel data
> Adding tunnels

Configured Tunnels (folder):

If tunnels have already been added (see Section 7.2.5.53, "Adding tunnels"), *Configured Tunnels* is displayed as a folder icon. In this case, double-click *Configured Tunnels* in the tree structure to view the defined tunnels.
Configured tunnels that have already been activated (see Section 7.2.5.2, "Activate the Configured VPN Tables") are indicated by a dark and struck-through bullet. Tunnels that have not yet been activated are marked by a bright bullet.
Right-click an individual tunnel to display a menu containing the following entries:

> Displaying tunnel data
> Rename Tunnel
> Editing tunnel data
> Deleting tunnels

7.2.5.52 Displaying general tunnel data

You can view a table listing detailed information for all configured tunnels.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (right-click) Configured Tunnels > *Display General Tunnel Data*

The *Configured IPsec Tunnels* mask is displayed. Each line in the table shown represents a configured tunnel. For descriptions of the individual columns, see Section 7.2.5.53, "Adding tunnels". The relevant transmit and receive rules are also displayed for each service.

7.2.5.53 Adding tunnels

You can add a new IPsec tunnel. A total of 256 tunnels can be configured for each HG 1500.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (right-click) Configured Tunnels > *Add Tunnel*

The *Add Configured IPsec Tunnel* mask is displayed.

Click the *Tunnel Data* option at the top of the input form. You can then edit the following fields:

- *Tunnel Name*: This field contains the name of the newly configured tunnel. Enter a character string in this field.
- *Type of the Local Tunnel Endpoint*: Select the endpoint address type at the sending end of the tunnel; you can specify a host name or a DNS name.
- *Local Tunnel Endpoint Address*: Enter the sender's address in a format suitable for the endpoint type.
- *Type of the Remote Tunnel Endpoint*: Select the type of the endpoint address on the tunnel receive side (only the IP address is currently supported).
- *Remote Tunnel Endpoint Address*: Enter the receive address in a format suitable for the endpoint type. In this field, 0.0.0.0 indicates that the tunnel endpoint is unknown. In this case, the tunnel must be configured by the peer (e.g. teleworker).
- *Session Key Handling*: Select the method for the key exchange (at present the only option is: *Automatically, using IKE protocol*).
- *Suggested Encryption Algorithms*: Select which encryption algorithms should be used (you can choose between *AES*, *DES and* 3DES)

- *Suggested Hash Algorithms*: Select which hash algorithms should be used (you can choose between *MD5* and *SHA1*). The selected algorithms are offered by the party who initiates IKE negotiation. The responder then selects the algorithms to be used.
- *Suggested Lifetime of the Session Keys*: Enter an accepted validity period for the session keys which will be used. When this period expires, no more data is exchanged within this session. New session keys are automatically negotiated to replace invalid session keys.
- *Suggested Lifetime of the Key Exchange Session*: Enter an accepted validity period for the key exchange session. Once the key exchange session has expired, new keys are automatically negotiated for it using the IKE protocol.
- *Suggested Data Volume of the Session Keys*: Enter the maximum data volume for the session keys. If the data volume is exceeded, new session keys are automatically negotiated using the IKE protocol. The data volume is not limited when "unlimited" is selected.

Click the *Key Exchange Data* option at the top of the input form.

You can enter data in the following fields for automatic key exchange:

- *Activate Perfect Forward Secrecy*: If you activate this option, the "Perfect Forward Secrecy" function is activated. This option should always be selected as it activates improved security mechanisms for data transfer via the tunnel.
- *VPN Peer Authentication Method*: Select the authentication method to be used for VPN subscribers (you can choose between *Digital Signatures* (authentication using certificates) and *Pre-Shared Keys* (authentication using self-defined manual keys).
- *Pre-Shared Key*: This field is only available if the authentication method is set to *Pre-Shared Keys*. Enter a password here which must be used by the VPN subscribers at both endpoints of the tunnel. At least 12 characters should be used.
- *Reenter Pre-Shared Key*: This field is only available if the authentication method is set to *Pre-Shared Keys*. Repeat the password specified above to make sure there are no typing errors.
- *List of CA Certificates*: These options are only available if the authentication method is set to *Digital signatures*. For authentication, VPN subscribers can use any certificate that has been issued (signed) by one of the selected CA certificates.
- *Suggested Diffie-Hellman Groups*: VPN subscribers can exchange keys by any of the selected methods.

You can enter data in the following fields for manual key exchange:

- *Security Parameter Index*: Enter a unique indicator in this field for the key information. Any number within the range `0` to `4294967295` can be selected. The number should be as high as possible (a high nine-digit or ten-digit number is recommended).

> ⓘ The security parameter index must differ for the inbound and outbound direction.

- *Session Key (Encryption)*: This field contains the key for the encryption algorithm. The key length depends on the encryption algorithm selected (see the following table).
- *Session Key (Hash)*: This field contains the key for the hash algorithm. The key length depends on the hash algorithm selected (see the following table).

> ⓘ The keys should differ for the inbound and outbound direction.

Algorithm	Public Key Length	
	Bit	Characters
DES	64	8
3DES	192	24
AES	128	16
MD5	128	16
SHA1	160	20

Table 7-1 Required Public Key Lengths

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Edit Configured IPsec Tunnel* mask is displayed.

7.2.5.54 Displaying tunnel data

This option allows you to display details on a configured tunnel. This is only possible if you have already configured a tunnel (see Section 7.2.5.53, "Adding tunnels").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (double-click) Configured Tunnels > (right-click) selected tunnel > *Display Tunnel Data*

The *Configured IPsec Tunnel* mask is displayed. In the dialog you can switch between *Tunnel Data* and *Key Exchange Data*. A different dialog appears depending on the type of key exchange method determined for the tunnel. For descriptions of the individual fields, see Section 7.2.5.42, "Adding IPsec service".

7.2.5.55 Rename Tunnel

You can change the name of a configured tunnel (see Section 7.2.5.53, "Adding tunnels"). All other tunnel-specific data remains unchanged.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (double-click) Configured Tunnels > (right-click) selected tunnel > *Rename Tunnel*

The *Configured IPsec Tunnel Name* mask is displayed. You can edit the following field:

- *Tunnel Name*: Change the name of the service in this field.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The renaming mask remains visible.

7.2.5.56 Editing tunnel data

This option allows you to display details on a configured tunnel. This is only possible if you have already configured a service (see Section 7.2.5.53, "Adding tunnels") but not yet activated it (bright bullet).

> If you want to edit an activated tunnel, you must delete it first (see Section 7.2.5.57, "Deleting tunnels"). Then add a new tunnel.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (double-click) Configured Tunnels > (right-click) selected tunnel > *Edit Tunnel Data*

The *Configured IPsec Tunnel* mask is displayed. For descriptions of the individual fields and how they work, see Section 7.2.5.53, "Adding tunnels".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Configured IPsec Tunnel* mask remains visible.

7.2.5.57 Deleting tunnels

You can delete a configured tunnel (see Section 7.2.5.53, "Adding tunnels").

> Deletion is not possible if a rule still exists for the tunnel you want to delete. You should therefore start by deleting rules (if applicable) that refer to the tunnel you want to delete (see Section 7.2.5.68, "Deleting rules").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Tunnels > (double-click) Configured Tunnels > (right-click) selected tunnel > *Delete Tunnel*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5.58 Rules

Rules define how IP packets should be handled. The following rule actions are possible:

- *Pass*: the IP packet is forwarded (allowed to pass). You can select whether the IP packet should use a VPN tunnel (encrypted) or not.
- *Deny*: the IP packet is not forwarded (ignored). You can select whether the IP packet should use a VPN tunnel (encrypted) or not.

Background information:

See Section 9.6.5, "Rules"

WBM path:

WBM > Explorers > Security > (double-click) VPN > *Rules*

Double-click *Rules* in the tree structure to display the following entries:

> Active Rules
> Configured Rules

You can use the *Active Rules* function to view which rules are active and which settings are enabled for these rules.

You can use the *Configured Rules* function to configure, edit, and delete rules.

7.2.5.59 Active Rules

Active rules become configured rules when the configuration is enabled – see Section 7.2.5.2, "Activate the Configured VPN Tables".

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Rules > *Active Rules*

Right-click *Active Rules* to display a menu containing the following entry:

> Displaying rules

Active Rules (folder):

If configured rules (see Section 7.2.5.62, "Configured Rules") were activated by activating the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables"), *Active Rules* is displayed as a folder icon. In this case, double-click *Active Rules* in the tree structure to view the activated rules. Right-click an individual rule to display a menu containing the following entries:

> Displaying rules

7.2.5.60 Displaying rules

You can view a table listing detailed information for all active rules.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Rules > (right-click) Active Rules > *Display Rules*

The *Active IPsec Rules* mask is displayed. Each line in the table displayed represents an active rule. For descriptions of the individual columns, see Section 7.2.5.64, "Adding rules".

The table can be sorted based on the columns *Priority*, *Service*, *Rule-Based Action*, *Encryption Required*, and *Rule State*. Click a column heading to sort the table on the basis of the associated column. The column header currently used as the sort criterion is indicated by a small triangle.

7.2.5.61 Displaying rules

This option allows you to display details on an active rule. This is only possible if you have already configured a rule (see Section 7.2.5.64, "Adding rules") and activated the configuration (see Section 7.2.5.2, "Activate the Configured VPN Tables").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Rules > (double-click) Active Rules > (right-click) selected rule > *Display Rule*

The *Active IPsec Rule* mask is displayed. For descriptions of the individual fields, see Section 7.2.5.64, "Adding rules".

7.2.5.62 Configured Rules

You can use the *Configured Rules* function to manage rules. Configured rules only become activated rules (see Section 7.2.5.2, "Activate the Configured VPN Tables") after activation (see Section 7.2.5.59, "Active Rules").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Rules > *Configured Rules*

Right-click *Configured Rules* to display a menu containing the following entries:

> Displaying rules
> Adding rules

Configured Rules (folder):

If configured rules were created, for example, by adding rules (see Section 7.2.5.64, "Adding rules"), *Configured Rules* is displayed as a folder icon. In this case, double-click *Configured Rules* in the tree structure to view the defined rules.
Configured rules that have already been activated (see Section 7.2.5.2, "Activate the Configured VPN Tables") are indicated by a dark bullet. Rules that have not yet been activated are marked by a bright bullet.

Right-click an individual rule to display a menu containing the following entries:

> Displaying rules
> Editing rules
> Add Rule for Opposite Direction
> Deleting rules

7.2.5.63 Displaying rules

You can view a table listing detailed information for all configured rules.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Rules > (right-click) Configured Rules > *Display Rules*

The *Configured IPsec Rules* mask is displayed. Each line in the table displayed represents an active rule. For descriptions of the individual columns, see Section 7.2.5.64, "Adding rules".

The table can be sorted based on the columns *Priority*, *Service*, *Rule-Based Action*, *Encryption Required*, and *Rule State*. Click a column heading to sort the table on the basis of the associated column. The column header currently used as the sort criterion is indicated by a small triangle.

7.2.5.64 Adding rules

You can add a new IPsec rule.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Rules > (right-click) Configured Rules > *Add Rule*

The *Add Configured IPsec Rule* mask is displayed. You can edit the following fields:

- *Priority*: Enter the required priority for the processing sequence as a figure. The highest priority is specified with 1. Each rule associated with a direction must be assigned its own priority. A rule and the associated opposite-direction rule must always have the same priority. You can only create the rule for the opposite direction with the menu item specifically provided for this purpose (see Section 7.2.5.67, "Add Rule for Opposite Direction").

> You can subsequently edit the priority of an existing rule. However, the connection is cleared down when you apply the change if this rule was in use while you were editing it.
> You should leave spaces between the assigned priorities to enable new rules to be added easily between existing rules if required. We recommend defining priorities in steps of ten or one hundred.

- *Service*: Select the service to which the encryption should be limited. Select *Any Service* if the encryption does not have to be limited to one service.
- *Rule-Based Action*: Select how the IP packets are to be dealt with by this rule: *pass* means that IP packets are transferred, *deny* means that no IP packets are transferred.
- *Encryption Required*: Specify whether or not this rule will require encryption. The encryption procedure is defined by the assigned tunnel.
- *Type*: Select the type for the source address and the destination address (you can choose between: *Host*, *Subnet*, *IP Address Range* and *DNS Name*).
- *IP address*: Enter the source and destination address in a format suitable for the selected type. The input mask depends on the address type selected. To use an arbitrary IP address, you must enter `0.0.0.0`. NAT must be deactivated at the interface to the destina-

tion network if `0.0.0.0` is specified as the destination IP address for transmitting packets in a tunnel. Alternatively, you can specify an IP address between `0.0.0.1` and `255.255.255.254` to transmit packets in a tunnel.

- *Tunnel on Receive Side*: Assign the tunnel on the receive side to which this rule should apply. IP packets received by the network are retrieved from this tunnel. Select *No Tunnel Assignment* if no tunnel should be assigned on the receive side.
- *Tunnel on Transmit Side*: At the transmit side, assign the tunnel to which this rule should apply. IP packets destined for the network are sent through this tunnel. Select *No Tunnel Assignment* if no tunnel should be assigned on the transmit side.

> ⓘ At least one tunnel assignment (either on the receive side or the transmit side) is required if the parameter *Encryption Required* is activated.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Configured IPsec Rule* mask is displayed.

7.2.5.65 Displaying rules

This option allows you to display details on a configure rule. This is only possible if you have already configured a rule (see Section 7.2.5.64, "Adding rules").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Rules > (double-click) Configured Rules > (right-click) selected rule > *Display Rule*

The *Configured IPsec Rule* mask is displayed. For descriptions of the individual fields, see Section 7.2.5.64, "Adding rules".

7.2.5.66 Editing rules

You can edit the data for a configured rule. This is only possible if you have already configured a rule (see Section 7.2.5.64, "Adding rules").

> ⓘ You cannot modify rules that have a rule for the opposite direction (see Section 7.2.5.67, "Add Rule for Opposite Direction"). If this is the case, you must first delete the rule for the opposite direction (see Section 7.2.5.68, "Deleting rules").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Rules > (double-click) Configured Rules > (right-click) selected rule > *Edit Rule*

The *Configured IPsec Rule* mask is displayed. For descriptions of the individual fields, see Section 7.2.5.64, "Adding rules".

> You can edit the priority of an existing rule. However, the connection is cleared down when you apply the change if this rule was in use while you were editing it.
> You should leave spaces between the assigned priorities to enable new rules to be added easily between existing rules if required. We recommend defining priorities in steps of ten or one hundred.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Configured IPsec Rule* mask remains visible.

7.2.5.67 Add Rule for Opposite Direction

If you have configured an IPsec rule for a transmission direction (see Section 7.2.5.64, "Adding rules"), you should add the rule for the opposite direction directly afterwards. You can use the "Add Rule for opposite direction" function to accept the entries for the selected rule. In this case, the source and destination addresses are interchanged and the tunnel assignment is changed accordingly.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Rules > (double-click) Configured Rules > (right-click) selected rule > *Add Rule for Opposite Direction*

The Add *Configured IPsec Rule for opposite direction* mask is displayed.

All rule parameters for the opposite direction match the rule for the transmission direction and therefore cannot be edited. The priority for these two directions is also identical.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The Add *Configured IPsec Rule for opposite direction* mask remains visible.

7.2.5.68 Deleting rules

You can delete a configured rule (see Section 7.2.5.64, "Adding rules").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Rules > (double-click) Configured Rules > (right-click) selected rule > *Delete Rule*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.5.69 Public Key Infrastructure (PKI)

PKI servers make the certificate revocation lists configured in the VPN available at a central location. This facilitates the distribution of certificates and certificate revocation lists in a large network.

WBM path:

WBM > Explorers > Security > (double-click) VPN > *Public Key Infrastructure*

Right-click *Public Key Infrastructure (PKI)* to display a menu containing the following entries:

> Display PKI Server
> Adding PKI servers

Public Key Infrastructure (PKI) (folder):

If PKI servers have already been added (see Section 7.2.5.71, "Adding PKI servers"), *Public Key Infrastructure* is displayed as a folder icon. In this case, double-click *Public Key Infrastructure* in the tree structure to view the PKI servers available. Right-click an individual PKI server to display a menu containing the following entries:

> Display PKI Server
> Delete PKI servers

7.2.5.70 Display PKI Server

You can view a table listing detailed information on all PKI servers.

WBM path:

WBM > Explorers > Security > (double-click) VPN > (right-click) Public Key Infrastructure (PKI) > *Display PKI Server*

The *PKI Server* mask is displayed. Each line in the table shown represents a configured PKI server. For descriptions of the individual columns, see Section 7.2.5.71, "Adding PKI servers".

7.2.5.71 Adding PKI servers

You can add a new PKI server.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (right-click) Public Key Infrastructure (PKI) > *Add PKI Server*

The *PKI Server* mask is displayed. You can edit the following fields:

- *Name of the PKI Server*: Give the server a name that is easy to recognize.

- *PKI Server Type*: Select the task of the server (you can choose between *LDAP* and *Enrollment*).
- *URL of the PKI Server*: Enter the URL of the server
(for example: `LDAP://139.21.92.144:389`).

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *PKI Server* mask is displayed.

7.2.5.72 Display PKI Server

You can view the data associated with a PKI server. This is only possible if you have already added at least one PKI server (see Section 7.2.5.71, "Adding PKI servers").

WBM path:

WBM > Explorers > Security > (double-click) VPN > (double-click) Public Key Infrastructure (PKI) > (right-click) desired PKI server > *Display PKI servers*

The *PKI Server* mask is displayed. For descriptions of the individual columns, see Section 7.2.5.71, "Adding PKI servers".

7.2.5.73 Delete PKI servers

This option allows you to delete a PKI server. This is only possible if you have already added at least one PKI server (see Section 7.2.5.71, "Adding PKI servers").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) VPN > (double-click) Public Key Infrastructure (PKI) > (right-click) selected PKI server > *Delete PKI Server*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.6 SSL

SSL permits secure administration of HG 1500. "Secure administration" means that all data transmitted between the access PC (via which you are administering HG 1500) and the board itself is encrypted. This eliminates the risk of transferred configuration data being monitored without authorization. SSL permits the encryption of transfer data and prevents manipulation. Transfer paths are authenticated by means of certificates. You can generate and administer certificates.

SSL must be configured and activated before it can be administered over WBM. For more information, see Section 7.2.6.1, "Initial Configuration and Activation of SSL".

Background information:

See Section 9.6, "SSL and VPN"

> Working with SSL requires a fundamental knowledge of encryption procedures and certification. Details on SSL terms, systems, and procedures are not included in the scope of this manual. Refer to the relevant technical literature if you require detailed information on these topics.

WBM path:

WBM > Explorers > Security > *SSL*

A menu containing the following entry is displayed when you right-click *SSL*.

> Reset to insecure mode

SSL is displayed as an expandable folder. Double-click *SSL* in the tree structure to display the following entries:

> Certificate Generation
> Certificate Management

Generate the required certificates via *Certificate Generation*. You can find self-signed certificates in the tree structure under *Certificate Management*. CA certificates can be found under *Certificate Generation*.

7.2.6.1 Initial Configuration and Activation of SSL

> Never use default passwords or preset user names. You should create individual accesses with high-level security before you switch to secure administration mode.

Requirements for switching from insecure to secure mode with SSL:

- the board must be assigned an IP address,
- a serial terminal or a PC with a terminal emulation program must be connected to the board's V.24 interface,
- you must start the HiPath system and log on to the board's WBM as user.

The following is a step-by-step description of how to activate SSL. This procedure assumes the use of MS Internet Explorer (Version 6.0) as the Web browser.

1. Enter the CLI command `reset secure` at the V.24 terminal.

   Apart from the IP address, all configuration data associated with the board is deleted. The board reboots and is set to SSL Enabled mode. User names and passwords are transferred from the HiPath system to the board and are once again available. However, the V.24 interface is now the only means of access for administering the board.

2. Log on by entering the user name and password.

3. Create and activate a self-signed SSL server certificate using the following command:

   ```
   create ssl certificate
   <cert.name><ser.num><subj.name><val.from><val.till>[<sig.alg>
   [<pub.key alg>[<pub.key len>[<alt.name>[<CRL distr. point>]]]]]
   ```

   This means:

   `<cert.name>` Certificate Name

   `<ser.num>` Serial Number of Certificate

   `<subj.name>` Subject name in the format `"C=<country>,O=<organization>, OU=<use>, CN=<name>"`, where `<country>` should be specified with two letters, for example `EN`. If `CN=`, you should enter the IP address or the DNS name of the gateway. Otherwise, the browser emits a warning every time you set up a connection.

   `<val.from>` Beginning of the certificate validity period in the format `YYYY/MM/DD/HH:MM:SS`

   `<val.till>` End of the certificate validity period in the format `YYYY/MM/DD/HH:MM:SS`

Optional parameters:

`<sig.alg>`	Signature algorithm type in the format `MD5_WITH_RSA` or `SHA1_WITH_RSA`
`<pub.key alg>`	Type of public key algorithm in the format `RSA`.
`<pub.key len>`	Public key length in the format `768`, `1024`, `1536` or `2048`.
`<alt.name>`	alternative subject name or IP address in the format `"C=<country>,O=<organization>, OU=<use>, CN=<name>"` where `<country>` is specified with two characters, for example, `EN` or `num.num.num.num` for an IP address
`<CRL distr. point>`	CRL distribution point, specify URL

Example

```
create ssl certificate root 1
"C=EN,O=Siemens,OU=Test,CN=192.168.101.24"
2003/01/01/00:00:00 2003/02/01/00:00:00
```

Once the command is entered, the fingerprint of the certificate that has just been generated is displayed. Make a note of this hexadecimal numeral.

> This fingerprint is important for checking the generated certificate at a later time. Only an unmodified certificate shows exactly the same fingerprint.

You can output the fingerprint of the certificate **currently active** with the `show fingerprint` CLI command. Please note that if you create and activate multiple certificates one after the other with CLI, the fingerprint output only ever refers to the last certificate activated.

The certificate is automatically stored once you have entered "`create SSL certificate...`".

If, however, you performed other changes that were not saved, you can use the `save configuration` CLI command to back up the current configuration.

4. Activate `enable ssl` to force an explicit restart.

5. Open MS Internet Explorer with an Administration PC connected via LAN and call up the board via the WBM address field. The entry must begin with `https` and must contain the IP address of the board. You can specify the port number `443` afterwards (optional).

   Example with optional port specification:

   ```
   https://192.168.10.104:443
   ```

   MS Internet Explorer displays the following security warning: *You are about to view pages over a secure connection. .... .*

6. Click *OK*.

   MS Internet Explorer displays the following security warning: *Information you exchange with this site cannot be viewed or changed by others. ....*

7. Click *View Certificate*.

> The following steps 7 through 13 are only necessary the first time. Once you have installed the certificate successfully, Internet Explorer automatically checks the server's fingerprint.
> You should always perform steps 7 through 13, however, when Internet Explorer issues the specified security warning in step 5.
> If you do not import the certificate, Internet Explorer re-issues the security warning shown in step 5 every time you start the WBM with HTTPS.
> Steps 10 through 12 are not mandatory. If you want to replace the certificate anyway, importing is unnecessary.

8. Check the issuer specifications and the period of validity. These must be identical to those of the self-signed SSL server certificate you previously generated. Click *Details*.

9. Scroll to the end of the list. Click *Fingerprint*.

   The complete fingerprint is displayed as a hexadecimal numeral in the lower window. Compare this numeral with the hexadecimal numeral that was issued when the SSL server certificate was created with the CLI command.

> If the two fingerprints are identical, the certificate is unchanged and you can accept it. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

If the two fingerprints (hexadecimal numerals) are identical:

10. Click *OK*.

    The security message for the server certificate is displayed again.

11. Click *View Certificate* once more.

    The first certificate dialog is displayed again. If the issuer specifications and the fingerprint were correct:

12. Click *Install Certificate....*

    The Certificate Management Import Wizard is started. Click *Next* until *Finish* is displayed. Click *Finish*.

13. Press *OK* to confirm the window displayed.

14. Click *Yes* in the security message for the server certificate.

The logon page opens. Log on by entering the user name and password. For example, you can use the access data that you entered for the V.24 Interface. If other user names and passwords have been set, you can use one of the passwords configured.

15. Check whether the certificate you created is listed in WBM (SSL > Certificate Management > Server Certificates). It should be the only certificate in this list and should be activated.

    The board is now in secure administration mode.

Follow-up steps:

You can now configure the board. First run the initial setup wizard (see Section 5.1, "Initial Setup").

The Certificate Generation function is available for creating the SSL CA certificate or further SSL server certificates, (see Section 7.2.6.3, "Certificate Generation").

The Certificate Management function is available for administering generated certificates (see Section 7.2.6.11, "Certificate Management").

A download function is available for saving the SSL configuration (see Section 6.1.2.1, "Load from Gateway").

7.2.6.2 Reset to insecure mode

All security-specific data (for example, all certificates and services and rules which you created yourself) is deleted when you disable the VPN and SSL functions and revert to insecure mode. If you did not save this data previously (see Section 6.1.2.1, "Load from Gateway"), then you will need to create it again when you revert to secure mode.

If you deactivate the VPN and SSL functions, the system reverts to the HTTP protocol. The Internet Explorer – which communicates via HTTPS in secure mode – immediately looses access to the board. The connection must be reestablished in the Explorer address bar. Use the HTTP protocol and port 8085 to do this.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (right-click) SSL > *Reset to insecure mode*

An important warning is displayed. Click *Activate Now* followed by *OK* in the confirmation mask. The board now automatically performs a restart.

7.2.6.3 Certificate Generation

This function is only available if SSL is enabled. You can generate CA certificates and self-signed server certificates. You can view, delete or export generated CA certificates using the *Certificate Generation* function. In addition, you can create or update server certificates using your own CA certificate.

Background information:

See Section 9.6.2, "Certificates"

WBM path:

WBM > Explorers > Security > (double-click) SSL > *Certificate Generation*

Right-click *Certificate Generation* to display a menu containing the following entries:

> Generating CA certificates
> Generate Self-Signed Certificate

Certificate Generation (folder):

If you have already generated CA certificates (see Section 7.2.6.4, "Generating CA certificates"), *Certificate Generation* is displayed in the tree structure as an expandable folder. In this case, double-click *Certificate Generation* in the tree structure to view CA certificates. Right-click the individual CA certificates to display a menu containing the following entries:

> View Certificate
> Delete Certificate
> Export Certificate [X.509]
> Generating a CA-signed server certificate [PKCS#12]
> Updating a CA-signed server certificate [X.509]

7.2.6.4 Generating CA certificates

You can create a new CA certificate.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (right-click) Certificate Generation > *Generate CA Certificate*

The *Generate self-signed SSL CA Certificate* mask is displayed. You can edit the following fields:

- *Certificate Name*: This field contains the certificate name. Enter a character string in this field.

- *Serial Number of Certificate*: Enter a serial number that you defined in this field. The number must be a positive integer.

> A serial number that is used once may not be used for another certificate as the serial number must be unique for every certificate that is created.

- *Type of Signature Algorithm*: Select the signature algorithm to be used for this certificate (you can choose between `md5RSA` and `sha1RSA`).
- *Public key length*: Select the length of the public key used for this certificate (you can choose between `768`, `1024`, `1536` and `2048`).
- *Start Time of Validity Period (GMT)*: Enter the start time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *End Time of Validity Period (GMT)*: Enter the end time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *Subject Name*: Specify the subject name data according to the conventions of the x.509 standard (for example in the "Country (C)" field:" `DE` for Germany).
- *Subject Alternative Name*: This optional information distinguishes between the "Distinguished Name Format" (such as, the data under "Subject Name") and "Other Format" (for example, the IP address entry). The input mask is dependent on the selected format.
- *CRL Distribution Point*: In this field, you can enter a URL to specify the location from which certificate revocation lists (CRL) are to be distributed.

When all settings are complete, click *Generate Certificate* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.6.5 Generate Self-Signed Certificate

You can create a new self-signed server certificate.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (right-click) Certificate Generation > *Generate Self-Signed Certificate*

The *Generate self-signed SSL Server Certificate* mask is displayed. You can edit the following fields:

- *Certificate Name*: This field contains the certificate name. Enter a character string in this field.
- *Serial Number of Certificate*: Enter a serial number that you defined in this field. The number must be a positive integer.

> ⓘ A serial number that is used once may not be used for another certificate as the serial number must be unique for every certificate that is created.

- *Type of Signature Algorithm*: Select the signature algorithm to be used for this certificate (you can choose between `md5RSA` and `sha1RSA`).
- *Public key length*: Select the length of the public key used for this certificate (you can choose between `768`, `1024`, `1536` and `2048`).
- *Start Time of Validity Period (GMT)*: Enter the start time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *End Time of Validity Period (GMT)*: Enter the end time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *Subject Name*: Specify the subject name data according to the conventions of the x.509 standard (for example in the "Country (C)" field:" `DE` for Germany).
- *Subject Alternative Name*: This optional information distinguishes between the "Distinguished Name Format" (such as, the data under "Subject Name") and "Other Format" (for example, the IP address entry). The input mask is dependent on the selected format.
- *CRL Distribution Point*: In this field, you can enter a URL to specify the location from which certificate revocation lists (CRL) are to be distributed.

When all settings are complete, click *Generate Certificate* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.6.6 View Certificate

You can view a CA certificate. This is only possible if you have already generated at least one CA certificate (see Section 7.2.6.4, "Generating CA certificates").

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Generation > (right-click) selected CA certificate > *Display Certificate*

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.6.4, "Generating CA certificates".

7.2.6.7 Delete Certificate

You can delete a CA certificate. This is only possible if you have already generated at least one CA certificate (see Section 7.2.6.4, "Generating CA certificates").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Generation > (right-click) selected CA certificate > *Delete Certificate*

A warning appears. The name of the certificate is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.6.8 Export Certificate [X.509]

You can export a CA certificate to a file. This is only possible if you have already generated at least one CA certificate (see Section 7.2.6.4, "Generating CA certificates").

X.509 is a standard for certificates. The name and the digital signature of the person who issued the certificate are also saved in the certificate. X.509 is part of the X.500 directory service for world-wide, distributed, and open systems.

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Generation > (right-click) selected CA certificate > *Export Certificate [X.509]*

The Web browser displays a mask that lets you save the file under a random name and in a random location. The certificate name is used for the file name.

7.2.6.9 Generating a CA-signed server certificate [PKCS#12]

You can generate a CA-signed server certificate based on a CA certificate. This is only possible if you have already generated at least one CA certificate (see Section 7.2.6.4, "Generating CA certificates"). The certificate generated is saved in a PKCS#12 file.

PKCS#12 files (PKCS#12 stands for "Personal Information Exchange Syntax Standard") save certificates with the private key. A PKCS#12 file therefore contains the necessary data for personal encryption and decryption.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Generation > (right-click) selected CA certificate > *Generate CA-Signed Server Certificate [PKCS#12]*

The *Generate SSL Server Certificate* mask is displayed. You can edit the following fields:

- *Passphrase for encryption*: Enter a password that you have defined (with at least seven characters) in this field. This password is requested if you want to import or view a PKCS#12 file.
- *Reenter Passphrase for encryption*: Repeat the password specified above in this field.
- *Serial Number of Certificate*: Enter a serial number that you defined in this field. The number must be a positive integer.

> A serial number that is used once may not be used for another certificate as the serial number must be unique for every certificate that is created.

The other fields are the same as those available when generating a CA certificate (see Section 7.2.6.4, "Generating CA certificates").

When all settings are complete, click *Generate Certificate*. The Web browser displays a mask that lets you save the certificate file under a random name and in a random location. The certificate name is used for the file name. Enter `.p12` as the file extension.

7.2.6.10 Updating a CA-signed server certificate [X.509]

You can extend the period of validity of a CA-signed server certificate: This is only possible if you have already saved a CA-signed server certificate as PKCS#12 file (see Section 7.2.6.9, "Generating a CA-signed server certificate [PKCS#12]").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Generation > (right-click) selected CA certificate > *Update CA-Signed Server Certificate [X.509]*

The *Update SSL Server Certificate* mask is displayed. You can edit the following fields:

- *Serial Number of Certificate*: Enter a serial number that you defined in this field. The number must be a positive integer.
- *Certificate to be Updated*: Enter the path and the file name of the certificate to be updated. Click *Browse...* to open a dialog to search for the certificate.
- *Start Time of Validity Period (GMT)*: Enter the start time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).
- *End Time of Validity Period (GMT)*: Enter the end time for certificate validity in these fields. The time specified is interpreted as Greenwich Mean Time (GMT).

When all settings are complete, click *Generate Certificate*. The Web browser displays a mask that lets you save the certificate file under a random name and in a random location. The certificate name is used for the file name.

7.2.6.11 Certificate Management

This option allows you to manage trusted CA certificates and server certificates.

Background information:

See Section 9.6.2, "Certificates"

WBM path:

WBM > Explorers > Security > (double-click) SSL > *Certificate Management*

Right-click *Certificate Management* to display a menu containing the following entry:

> View Certificate From File

The following entries are listed under *Certificate Management*.

> Trusted CA Certificates
> Server Certificates

7.2.6.12 View Certificate From File

If you have saved certificates in files, you can read and view the certificate data from the relevant file.

WBM path:

WBM > Explorers > Security > (double-click) SSL > (right-click) Certificate Management > *View Certificate From File*

The *Display Certificate* mask is displayed. You must fill out the following fields to view certificate data from a file:

- *PKCS#12 Format*: You must activate this field if the certificate is saved in a PKCS#12 file.
- *Passphrase for decryption*: If you activate the *PKCS#12 Format* field, you must enter the same password here as used for file creation.
- *File with Certificate*: Enter the path and the file name of the certificate in this field. Click *Browse...* if you are unsure of the storage location. A search dialog is displayed.

Click *View Certificate*.

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.6.4, "Generating CA certificates".

7.2.6.13 Trusted CA Certificates

This option allows you to manage trusted CA certificates.

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > *Trusted CA Certificates*

Right-click *Trusted CA Certificates* to display a menu containing the following entries:

> Importing trusted CA certificates [X.509]

Trusted CA Certificates (folder):

If you have already imported CA certificates (see Section 7.2.6.14, "Importing trusted CA certificates [X.509]"), *Trusted CA Certificates* is displayed in the tree structure as an expandable folder. In this case, double-click *Trusted CA Certificates* in the tree structure to view imported CA certificates. Right-click the individual CA certificates to display a menu containing the following entries:

> View Certificate
> Delete Certificate

7.2.6.14 Importing trusted CA certificates [X.509]

You can import the CA certificate from SSL certificate generation or an external CA certificate that was used to sign SSL server certificates. An import of this kind is necessary if MGAF is used over SSL. In this case, you must import the certificates that were used to sign the other gateways' server certificates as trusted CA certificates.

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (right-click) > Trusted CA Certificates > *Import Trusted CA Certificate [X.509]*

The *Import SSL CA Certificate* mask is displayed. You can edit the following fields:

- *Certificate Name*: In this field, specify the name of the certificate.
- *File with Certificate*: Enter the path and the file name of the certificate to be imported. Click *Browse...* to open a dialog to search for the certificate.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.2.6.15 View Certificate

You can view a trusted CA certificate. This is only possible if you have already imported at least one trusted CA certificate (see Section 7.2.6.14, "Importing trusted CA certificates [X.509]").

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (right-click) selected certificate > *Display Certificate*

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.6.4, "Generating CA certificates".

7.2.6.16 Delete Certificate

You can delete a configured trusted CA certificate. This is only possible if you have already imported at least one trusted CA certificate (see Section 7.2.6.14, "Importing trusted CA certificates [X.509]").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Trusted CA Certificates > (right-click) selected certificate > *Delete Certificate*

A warning appears. The name of the certificate is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.6.17 Server Certificates

You can manage server certificates and certificate signing requests (CSR).

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > *Server Certificates*

Right-click *Server Certificates* to display a menu containing the following entries:

> Generating a Certificate Signing Request (CSR)
> Importing a server certificate [PKCS#12]

Server Certificates (folder):

If you have already generated a self-signed certificate (see Section 7.2.6.5, "Generate Self-Signed Certificate"), a certificate signing request (see Section 7.2.6.18, "Generating a Certificate Signing Request (CSR)") or imported a server certificate (see Section 7.2.6.19, "Importing a server certificate [PKCS#12]"), *Server Certificates* is displayed as a folder icon in the tree structure. Double-click *Server Certificates* in the tree structure to view individual server certificates and certificate signing requests.

Server Certificates:

Right-click the individual server certificates to display a menu containing the following entries:

> View Certificate
> Delete Certificate
> Export Certificate [X.509]
> Import Updated Certificate [X.509]
> Activate Certificate

Certificate Signing Requests (CSR):

Right-click an individual certificate signing request (CSR) (yellow icon) to display a menu containing the following entries:

> Display Certificate Signing Request (CSR)
> Deleting a Certificate Signing Request (CSR)
> Exporting a Certificate Signing Requests (CSR)
> Import Certificate for CSR [X.509]

7.2.6.18 Generating a Certificate Signing Request (CSR)

A certificate signing request (CSR) can be sent to a CA to demand a certificate. You can generate a certificate signing request.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (right-click) Server Certificates > *Generate Certificate Signing Request (CSR)*

The *Generate SSL Certificate Signing Request* mask is displayed. You can edit the following fields:

- *Certificate Request Name*: This field contains the name of the certificate signing request. Enter a character string in this field.
- *Type of Signature Algorithm*: Select the signature algorithm to be used for this certificate (you can choose between `md5RSA` and `sha1RSA`).

- *Public key length*: Select the length of the public key used for this certificate (you can choose between `768`, `1024`, `1536` and `2048`).
- *Subject Name*: Specify the subject name data according to the conventions of the x.509 standard (for example in the "Country (C)" field:" `DE` for Germany).
- *Subject Alternative Name*: This optional information distinguishes between the "Distinguished Name Format" (such as, the data under "Subject Name") and "Other Format" (for example, the IP address entry). The input mask is dependent on the selected format.

When all settings are complete, click *Generate CSR*. A certificate signing request is generated. The CSR and the associated private keys are saved in the folder for server certificates. The private key is not visible. CSRs are displayed in yellow.

7.2.6.19 Importing a server certificate [PKCS#12]

A PKCS#12 file contains the data for a certificate and the associated private key. You can import the relevant PKCS#12 file to use this certificate.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (right-click) Server Certificates > *Import Server Certificate [PKCS#12]*

The *Import SSL Certificate* mask is displayed. You can edit the following fields:

- *Certificate Name*: In this field, specify the name of the certificate.
- *Passphrase for decryption*: In this field, enter the password which was used for creating the PKCS#12 file.
- *File with Certificate*: Specify the path and name of the file which contains the certificate data to be imported. Click *Browse...* to open a dialog to search for the file.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.2.6.20 View Certificate

You can view a server certificate.

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate > *Display Certificate*

The *Certificate Information* mask is displayed. This displays general certificate data (such as the name, type and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format. For a detailed description of the fields, see Section 7.2.6.5, "Generate Self-Signed Certificate".

7.2.6.21 Delete Certificate

You can delete a server certificate.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate > *Delete Certificate*

A warning appears. The name of the certificate is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.6.22 Export Certificate [X.509]

You can export a server certificate to a file.

X.509 is a standard for certificates. The name and the digital signature of the person who issued the certificate are also saved in the certificate. X.509 is part of the X.500 directory service for world-wide, distributed, and open systems.

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate > *Export Certificate [X.509]*

The Web browser displays a mask that lets you save the file under a random name and in a random location. The certificate name is used for the file name.

7.2.6.23 Import Updated Certificate [X.509]

You can import the file associated with an updated server certificate into an existing server certificate (see also Section 7.2.6.10, "Updating a CA-signed server certificate [X.509]").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate > *Import Updated Certificate [X.509]*

The *Import SSL Certificate* mask is displayed. The name of the import-destination certificate is displayed for verification purposes. You can edit the following field:

- *File with Certificate*: Specify the path and name of the file which contains the certificate data to be imported. Click *Browse...* to open a dialog to search for the file.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.2.6.24 Activate Certificate

Only one SSL server certificate is used by the Web server at any given time. The word *active* is displayed after the name of this certificate in the tree structure. If the Web server is to use another server certificate, you must activate this.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate > *Activate Certificate*

A warning appears.

Click *Activate Now*.

MS Internet Explorer displays the following security warning: *This page requires a secure connection which includes server authentication. ...* Click *View Certificate* in the window displayed.

Check the issuer specifications and the period of validity. These must be identical to those of your SSL server certificate. Click *Details*.

Scroll to the end of the list. Click *Fingerprint*. The complete fingerprint is displayed as a hexadecimal numeral in the lower window.

> ⚠ If the fingerprint is unchanged, the certificate is unchanged and you can accept it. Otherwise, an attempted attack may have taken place. Appropriate measures should be taken.

Click *OK* to close the dialog. Answer *Yes* to confirm each security prompt until the server certificate is activated.

7.2.6.25 Display Certificate Signing Request (CSR)

You can view the data for a generated certificate signing request (see Section 7.2.6.18, "Generating a Certificate Signing Request (CSR)").

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate signing request (yellow icon) > *Display Certificate Signing Request (CSR)*

The *Certificate Signing Request Information* mask is displayed. This mask provides information on the name of the CSR, the subject name and encryption. The public key used and the fingerprint are displayed in hexadecimal format.

7.2.6.26 Deleting a Certificate Signing Request (CSR)

You can delete the data for a generated certificate signing request (see Section 7.2.6.18, "Generating a Certificate Signing Request (CSR)").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate signing request (yellow icon) > *Delete Certificate Signing Request (CSR)*

A warning appears. The name of the certificate signing request is also specified for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.2.6.27 Exporting a Certificate Signing Requests (CSR)

You can export the data for a generated certificate signing request to another file (see Section 7.2.6.18, "Generating a Certificate Signing Request (CSR)").

WBM path:

WBM > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate signing request (yellow icon) > *Export Certificate Signing Request (CSR)*

An operating system download dialog is displayed. Save the file under a random name and in a random location.

7.2.6.28 Import Certificate for CSR [X.509]

You can import certificates in which the public key matches the CSR's private key.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Security > (double-click) SSL > (double-click) Certificate Management > (double-click) Server Certificates > (right-click) selected certificate signing request (yellow icon) > *Import Certificate for CSR [X.509]*

The *Import SSL Certificate* mask is displayed. You can edit the following field:

- *File with Certificate*: Specify the path and name of the file that contains the certificate data to be imported. Click *Browse...* to open a dialog to search for the file.

Click *View Fingerprint of Certificate*.
A window showing the fingerprint of the certificate to be imported is displayed. Check the fingerprint (= hexadecimal numeral). The fingerprint always changes if a certificate has been changed. An unchanged fingerprint is the only guarantee that the certificate is authentic. If the two fingerprints are not identical, an attempted attack has probably occurred. Appropriate measures should be taken.

Click *OK* to close the window with the fingerprint.

Click *Import Certificate from File*if you are satisfied with the fingerprint check. Do not import the certificate if the fingerprint does not meet your expectations.

7.3 Network Interfaces

The gateway has two LAN interfaces. Both interfaces can be configured separately. The second LAN interface is disabled by default. If you want to use the second LAN interface, you must enable the function and specify the interface’s operation mode.

WBM path:

WBM > Explorers > *Network Interfaces*

The *Network Interfaces* tree structure is displayed.

Entries under *Network Interfaces*:

> LAN1 (LAN1)
> LAN2 ([not used])

Right-click *Network Interfaces* to display a separate menu containing the following entries:

> Display Host Name
> Edit Host Name

7.3.1 Host Name

You can assign a host name to the HG 1500 and view the assigned host name.

WBM path:

WBM > Explorers > (right-click) Network Interfaces

A menu containing the following entries is displayed:

> Display Host Name
> Edit Host Name

7.3.1.1 Display Host Name

This option allows you to verify the HG 1500 host name.

WBM path:

WBM > Explorers > (right-click) Network Interfaces > *Display Host Name*

The *Host Name* mask is displayed.

7.3.1.2 Edit Host Name

You can assign a different host name to the HG 1500.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > (right-click) Network Interfaces > *Edit Host Name*

The *Host Name* mask is displayed. You can make the following entry:

- *Host Name*: Contains the host name for the board. Enter a character string in this field

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.3.2 LAN1 (LAN1)

With this option, you can configure LAN1 interface details. The function of the first LAN interface is predefined: The LAN1 interface is used for connecting the HG 1500 to the LAN.

Background information:

See Section 9.1, "Environmental Requirements for VoIP"
See Section 9.2, "Bandwidth Requirements in LAN/WAN Environments"
See Section 9.3, "Quality of Service (QoS)"

WBM path:

WBM > Explorers > Network Interfaces > *LAN1 (LAN1)*

Right-click *LAN1 (LAN1)* to display a menu containing the following entries:

> Display LAN1 Interface
> Edit LAN1 Interface

7.3.2.1 Display LAN1 Interface

You can display detailed information on using the LAN1 interface.

WBM path:

WBM > Explorers > Network Interfaces > (right-click) LAN1 (LAN1) > *Display LAN1 Interface*

The *LAN1* mask is displayed. For descriptions of the individual fields, see Section 7.3.2.2, "Edit LAN1 Interface".

7.3.2.2 Edit LAN1 Interface

This option allows you to edit the settings for using the LAN1 interface.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Network Interfaces > (right-click) LAN1 (LAN1) > *Edit LAN1 Interface*

The *LAN1* mask is displayed. You can edit the following fields:

- *Interface Is Active*: Select this option if you want to activate this interface.
- *IP address*: Specify the IP address of the interface in this field.
- *IP Netmask*: Specify the subnet mask in this field.
- The MAC address of the LAN1 interface is displayed here for information purposes.
- *Ethernet Link Mode*: Select the operation mode for the LAN interface from the context menu:
  - *Auto*: automatic switching between 10 and 100 Mbps and half duplex and full duplex mode
  - *10HDX*: 10 Mbps, half duplex
  - *10FDX*: 10 Mbps, full duplex
  - *100HDX*: 100 Mbps, half duplex
  - *100FDX*: 100 Mbps, full duplex

> The interface partners must be identically configured to guarantee LAN functionality.

- *Maximum Data Packet Size (Byte)*: Enter the maximum packet length in bytes that should apply for this IP protocol. Values between 576 and 1500 are permitted.
- *QoS Capability of Peer*: Select one of the possible settings from the context menu (see also Section 7.1.7, "Quality of Service"):
- *IEEE802.1p/q Tagging*: This option can be used to set the Ethernet format that is sent by the board. The option is normally deactivated.

> The following fields are only shown when *IEEE802.1p/q Tagging* is activated.

  - *IEEE802.1p/q VLAN ID*: Enter a value that differs from the default value "0" as the VLAN’s ID number if the switch used has problems with the default value "0".
  - *Data traffic*: Enter a value for the priority of the layer 2 QoS class "Data Traffic". Values between 0 and 7 are permitted. Default = 0.

- *Signaling data*: Enter a value for the priority of the layer 2 QoS class "*Signaling Data*". Values between 0 and 7 are permitted. Default = 3.
- *Voice/Fax/Modem Payload***:** Enter a value for the priority of the layer 2 QoS class "*Voice/Fax/Modem Payload*". Values between 0 and 7 are permitted. Default = 5.
- *Network control*: Enter a value for the priority of the layer 2 QoS class "Network Control". Values between 0 and 7 are permitted. Default = 0.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.3.3 LAN2 ([not used])

With this option, you can configure LAN2 interface details. Unlike the LAN1 interface, the function (mode) of the LAN2 interface is not predefined for the HG 1500. This allows a DSL connection to be established, for example.

> ℹ If one or more Internet telephony service providers are activated on an HG1500 system, a DSL connection to the Internet is not permitted on this system. Another router must be used to connect to the Internet.

Background information:

See Section 9.1, "Environmental Requirements for VoIP"
See Section 9.2, "Bandwidth Requirements in LAN/WAN Environments"
See Section 9.3, "Quality of Service (QoS)"

WBM path:

WBM > Explorers > Network Interfaces > *LAN2 ([not used])*

Right-click *LAN2 ([not used])* to display a menu containing the following entries:

> Display LAN2 Mode
> Display LAN2 Interface
> Edit LAN2 Interface

If the LAN2 interface has already been configured as a DSL connection (of the type PPTP or PPPoE), the following two options will also be available:

> Display ACD
> Edit ACD

7.3.3.1 Display LAN2 Mode

This option allows you to check if the LAN2 interface of the HG 1500 is currently in use, and what mode has been configured.

WBM path:

WBM > Explorers > Network Interfaces > (right-click) LAN2 ([not used]) > *Display LAN2 Mode*

The *Operating Mode of Second LAN Interface* mask is displayed.

7.3.3.2 Display LAN2 Interface

You can display detailed information on using the LAN2 interface. This option is only available if a function has been configured for the LAN2 interface (see Section 7.3.3.3, "Edit LAN2 Interface").

WBM path:

WBM > Explorers > Network Interfaces > (right-click) LAN2 ([not used]) > *Display LAN2 Interface*

The *LAN2* mask is displayed. For descriptions of the individual fields, see Section 7.3.3.3, "Edit LAN2 Interface".

7.3.3.3 Edit LAN2 Interface

This option allows you to display detailed information on how to use the LAN2 interface.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Network Interfaces > (right-click) LAN2 ([not used]) > *Edit LAN2 Interface*

The *LAN2* mask is displayed. The display and the available fields depend on the current setting in the first field *Use the Second LAN as*. For this reason, first select the required function of the LAN2 interface in this field. The following entries are available for selection:

- *Not configured or deactivated*: Do not use the LAN2 interface.
- *LAN2*: Use the LAN2 interface to connect the system to a second LAN.
  (see Subsection Selected connection type: LAN2)
- *DSL Connection Type PPTP*: Use the LAN2 to connect via DSL to a PPTP connection.
  (see Subsection Selected connection type: DSL Connection Type PPTP)
- *DSL Connection Type PPPoE*: Use the LAN2 interface to connect via DSL to a PPPoE connection.
  (see Subsection Selected connection type: DSL Connection Type PPPoE)

Selected connection type: *LAN2*

If you have selected *LAN2* in the field *Use the Second LAN as*, you can edit the following fields:

- *IP address*: Specify the IP address of the interface in this field.
- *IP Netmask*: Specify the subnet mask in this field.
- The MAC address of the LAN2 interface is displayed here for information purposes.
- *Ethernet Link Mode*: Select the operation mode for the LAN interface from the context menu:
  - *Auto*: automatic switching between 10 and 100 Mbps and half duplex and full duplex mode
  - *10HDX*: 10 Mbps, half duplex
  - *10FDX*: 10 Mbps, full duplex
  - *100HDX*: 100 Mbps, half duplex
  - *100FDX*: 100 Mbps, full duplex

> The interface partners must be identically configured to guarantee LAN functionality.

- *Maximum Data Packet Size (Byte)*: Enter the maximum packet length in bytes that should apply for this IP protocol. Values between 576 and 1500 are permitted.
- *Network Address Translation*: Select this option if you want to activate the function for masking private (internal) IP addresses.
- *QoS Capability of Peer*: Select one of the possible settings from the context menu (see also Section 7.1.7, "Quality of Service"):
- *Bandwidth Control for Voice Connections*: Bandwidth control can be used to ensure that a guaranteed level of bandwidth is available for voice connections (as a percentage of the entire bandwidth available for the connection). This means that data-only transmissions, for example, cannot fully use the uplink function to the Internet over LAN2. Select the checkbox if you want to activate the "Bandwidth Control for Voice Connections" function.
- *Bandwidth of Connection (Kbps)*: Enter the bandwidth of the connection in kilobits per second.
- *Bandwidth Used for Voice/Fax (%)*: Specify the percentage of bandwidth that should be used for voice/fax connections.
- *IEEE802.1p/q Tagging*: This option can be used to set the Ethernet format that is sent by the board. The option is normally deactivated. The following fields are only shown when *IEEE802.1p/q Tagging* is activated.

- *IEEE802.1p/q VLAN ID*: When the IEEE802.1p option is active, you can enter a value that differs from the default value "0" as the VLAN’s ID number if the switch used has problems with the default value "0".
- *Data traffic*: Enter a value for the priority of the layer 2 QoS class "Data Traffic". Values between 0 and 7 are permitted. Default = 0.
- *Signaling data*: Enter a value for the priority of the layer 2 QoS class "*Signaling data*“. Values between 0 and 7 are permitted. Default = 3.
- *Voice/Fax/Modem Payload*: Enter a value for the priority of the layer 2 QoS class "*Voice/Fax/Modem Payload*“. Values between 0 and 7 are permitted. Default = 5.
- *Network control*: Enter a value for the priority of the layer 2 QoS class "Network Control". Values between 0 and 7 are permitted. Default = 0.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

Selected connection type: *DSL Connection Type PPTP*

If you have selected *DSL Connection Type PPTP* in the field *Use the Second LAN as*, you can edit the following fields:

IP Parameters:

- *Remote IP Address of the PPP Connection*: Enter the IP address of the remote end of the PPP connection in this field. If this PPP connection is used for Internet access, this entry is only necessary if the Internet Service Provider uses a static IP address.
- *Local IP Address of the PPP Connection*: Enter the IP address of the local HXG3 board in this field. If this PPP connection is used for Internet access, this entry is only necessary if the Internet Service Provider assigned you a static IP address.
- *Maximum Data Packet Size (Byte)*: Enter the maximum packet length in bytes for the IP protocol. The permitted range of values goes from 576 to 1500 bytes.
- *Negotiate IP Address*: Select how the connection partners should negotiate the IP address at connection setup.

General PPP Parameters:

- *Default Router*: Activate this option if you want to use the DSL connection configured here as a routing destination. Please note that you can only have one default router: this is either the DSL access configured here or an individual PSTN peer – see also Section 7.4.4, "PSTN".
- *Internet Access with DNS Request*: Specify if you want to use the access for Internet access. Note that only one Internet access may be activated per HiPath 3000/5000 V8 - HG 1500 V8 (either one PSTN peer or one DSL connection).

- *Name of the Internet Service Provider*: Enter a name of your choice here with which you can identify the ISP.
- *PPP Default Header*: Specify whether the "default header" should be transferred for the recipient.
- *IP Header Compression*: Specify whether TCP headers should be compressed. UDP and RTP headers are always compressed.
- *Send LCP Echo Request*: Specify if an LCP echo request should be sent. This function is used to check if the connection is still active.
- *Automatic PPP Connection*: Specify if the PPP connection should be automatically established at system startup.
- *Automatic PPP Reconnection*: Specify if the PPP connection should be automatically reestablished after a connection cleardown (for example, in the case of ISP access with flat rate and forced cleardown after 24 hours).

PPTP Parameter:

- *Local IP Address of the Control Connection*: Enter the IP address of the HiPath HG 1500 used for PPTP connections. The default value is 10.0.0.140. The addresses 0.0.0.0 and 255.255.255.255 are not allowed.
- *Remote IP Address of the Control Connection*: Enter the IP address of the host computer to which the PPTP connection should be established. The default value is 10.0.0.138. The addresses 0.0.0.0 and 255.255.255.255 are not allowed.
- *Remote Netmask for the Control Connection*: Enter the netmask for the PPTP connection in this field.

Short Hold:

- *Short Hold*: Select this checkbox if you want to activate the "Short Hold" function.
- *Short Hold Time (sec)*: Enter the inactivity timeout after which the connection should be cleared down. The connection will be reestablished automatically as soon as new data packets are received. The short-hold timer is only triggered by outgoing packets.

Authentication:

- *PPP Authentication*: Specify whether authentication should be performed. The parameter mask is extended if this check box is selected:
  - *PAP Authentication Mode*: Specify which type of authentication should be used for the PPP connection (PAP Client, PAP Host, not used).
  - *PAP Password*: Specify the password to be entered by the user for identification in the case of PAP authentication. Data cannot be entered in the field if PAP authentication is not used.

- *CHAP Authentication Mode*: Specify which type of authentication should be used for the PPP connection (CHAP Client, CHAP Host, CHAP Symmetric, not used).
- *CHAP Password*: Specify the password to be entered by the user for identification in the case of CHAP authentication. Data cannot be entered in the field if CHAP authentication is not used.
- *PPP User Name*: Enter a user name of your choice that should be used for authentication via PAP or CHAP.

Data Compression:

The STAC and MPPC compression algorithms are available for compressing PPP data packets. STAC is widely used in the UNIX world, while MPPC is the Microsoft alternative. Both algorithms offer similar compression results. MPPC features a more robust resynchronization mechanism to deal with packet loss and is the preferred option if transmission quality is low. Please note that pre-compressed data (.ZIP files) and files containing binary data (for example, audio/video files, *.exe files, etc.) cannot be compressed further and thereby transmitted quicker.

- *STAC Data Compression*: Specify whether STAC should be used for data compression.
- *MPPC Data Compression*: Specify whether MPPC should be used for data compression.

Address Translation:

- *NAT Enabled*: Specify whether the "Network Address Translation (NAT)" function should be disabled or enabled. The active function supports the following protocols: TCP, UDP, and ICMP (only in passive mode).
- *Address Mapping Enabled*: Specify whether the "Address Mapping" function should be disabled or enabled.

QoS Parameters of Interface:

- *Bandwidth Control for Voice Connections*:Bandwidth control prevents the transmission rates available from being overbooked with voice connections within a multi-link connection. In other words when header compression is active, a maximum of five voice connections (G.729/60 msec or G.723/60 msec) is permitted over a B channel. Select this check box if you want to activate the "Bandwidth Control for Voice Connections" function. This function only affects connections from one HG 1500 to another.
- *Bandwidth of Connection (Kbps)*: Enter the required bandwidth of the connection in Kbps.
- *Bandwidth Used for Voice/Fax (%)*: Specify the percentage of bandwidth that should be used for voice/fax connections. (see also Section 7.1.7, "Quality of Service").
- *QoS Capability*: Enter the "Quality of Service (QoS)" that is supported by the other party (Identical, DiffServ or IP Precedence). See also Section 9.3, "Quality of Service (QoS)".
  - *Identical*: Both "DiffServ" and "IP Precedence" are accepted for the evaluation.

- *DiffServ*: The connection partner prefers to work with the evaluation of the "Differentiate Services" 6-bit field (newer procedure).
- *IP Precedence*: The connection partner prefers to work with the evaluation of the "IP Precedence" 3-bit field (older procedure).

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

Selected connection type: *DSL Connection Type PPPoE*

If you have selected *DSL Connection Type PPPoE* in the field *Use the Second LAN as*, you can enter the same settings as for "Selected connection type: DSL Connection Type PPTP" apart from the PPTP parameters.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.3.3.4 Display ACD

ACD stands for "Automatic Control of Disconnect". You can view the current ACD settings. This function can only be selected if the LAN2 interface has been configured as DSL connection of the type PPTP or PPPoE (see Section 7.3.3.3, "Edit LAN2 Interface").

WBM path:

WBM > Explorers > Network Interfaces > (double-click) LAN2 ([not used]) > (right-click) > *Display ACD*

The *ACD Configuration* mask is displayed. For descriptions of the individual fields, see Section 7.3.3.5, "Edit ACD".

7.3.3.5 Edit ACD

ACD stands for "Automatic Control of Disconnect". You can edit the current ACD settings. This option was introduced because Internet Service Providers sever DSL connections after a certain amount of time (usually once every day) even if the customer has purchased a flat rate connection; subsequently, the DSL connection is reestablished automatically. However, each time the connection is reestablished, the ISP assigns a new dynamic IP address. By configuring the ACD settings you can determine the exact times when the IP addresses will be changed. This is of particular importance if you use the DynDNS function (see Section 7.1.5, "DynDNS"). In this case, you can synchronize the IP address change (ACD) and the update interval for the DynDNS service (see Section 7.1.5.2, "Update Timer for DNS Names").

This function can only be selected if the LAN2 interface has been configured as DSL connection of the type PPTP or PPPoE (see Section 7.3.3.3, "Edit LAN2 Interface").

WBM path:

WBM > Explorers > Network Interfaces > (double-click) LAN2 ([not used]) > (right-click) > *Edit ACD*

The *ACD Configuration* mask is displayed. You can edit the following fields:

- *Force Reconnect at*: In these three fields, you can specify a time of day at which the connection will be severed and reestablished automatically. Enter the hours in the first field, the minutes in the second field and the seconds in the third field. Entering 15:30:00, for example, will cause the connection to be severed and reestablished at 15:30 every day.

The following field is displayed for verification:

- *Connection Time*: hours, minutes and seconds elapsed since the last connection was severed and reestablished automatically.

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4 Routing

In small networks, a routing table can be set up manually on every router by the network administrator. In larger networks, this task is automated with the help of a protocol that distributes routing information in the network.

An IP packet can transit many routers before it reaches its destination. The route it takes is not defined centrally, but by the routing tables in the individual routers along the way. Each router only establishes the next step on the path and relies on the next router to forward the packet correctly.

In HG 1500, you can configure IP routing, IP mapping, NAT, PSTN routing and SCN routing.

WBM path:

WBM > Explorers > *Routing*

The *Routing* tree structure is displayed.

Entries under *Routing*:

> IP Routing
> IP mapping
> NAT
> PSTN
> Dialing Parameters

7.4.1 IP Routing

In HG 1500, both static routes and a default router can be configured. Diagnostic and monitoring tools are also available for routing.

WBM path:

WBM > Explorers > Routing > (double-click) *IP Routing*

The following entries are listed:

> Static Routes
> Default Router
> DNS Settings
> Address Resolution Protocol
> ICMP Request

7.4.1.1 Static Routes

HG 1500 supports static routes only. Static routes connect two devices with each other. They are created manually.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > *Static Routes*

Right-click *Static Routes* to display a menu containing the following entries:

> Display Static Route Table
> Add Static Route

Static Routes (folder):

If you have already added static routes (see Section 7.4.1.3, "Add Static Route"), *Static Routes* is displayed as an expandable folder. In this case, double-click *Static Routes* in the tree structure to view the configured static routes. Right-click an individual route to display a menu containing the following entries:

> Display Static Route
> Edit Static Route
> Delete Static Route

7.4.1.2 Display Static Route Table

You can view a table containing all static routes created.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > (right-click) Static Routes > *Display Static Route Table*

The *Static Route Table* mask is displayed.
For descriptions of the individual fields, see Section 7.4.1.3, "Add Static Route".

7.4.1.3 Add Static Route

You can create a new static route between two IP devices.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP Routing > (right-click) Static Routes > *Add Static Route*

The *Add Static Route* mask is displayed. You can edit the following fields:

- *Route Name*: The name of the static route. Enter a character string.
- *Destination Network/Host*: The IP address of the destination network.
- *Destination Netmask*: The subnet mask of the destination network.
- *Route Gateway*: The IP address of the next router on this route or the IP address of the local or remote interface of a PSTN peer.

The route index is automatically assigned and only displayed for information purposes. It cannot be modified.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.1.4 Display Static Route

You can view the data associated with a configured static route (see Section 7.4.1.3, "Add Static Route").

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > (double-click) Static Routes > (right-click) selected static route > *Display Static Route*

The *Static Route* mask is displayed. For descriptions of the individual fields, see Section 7.4.1.3, "Add Static Route".

7.4.1.5 Edit Static Route

You can edit the data associated with a configured static route (see Section 7.4.1.3, "Add Static Route").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP Routing > (double-click) Static Routes > (right-click) selected static route > *Edit Static Route*

The *Static Route* mask is displayed. For descriptions of the individual fields, see Section 7.4.1.3, "Add Static Route".

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.1.6 Delete Static Route

This option allows you to delete existing static routes (see Section 7.4.1.3, "Add Static Route").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP Routing > (double-click) Static Routes > (right-click) selected static route > *Delete Static Route*

The *Delete Static Route* mask is displayed. The data associated with the static route to be deleted is displayed for verification purposes. For descriptions of the individual fields, see Section 7.4.1.3, "Add Static Route".

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.1.7 Default Router

To ensure that HG 1500 also reaches destinations that are not explicitly listed in the route table, a gateway must be specified for forwarding such packets (default router).

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > *Default Router*

Right-click *Default Router* to display a menu containing the following entries:

> Display Default Router
> Editing a default router

7.4.1.8 Display Default Router

This option allows you to view the current settings for the default router.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > (right-click) Default Router > *Display Default Router.*

The *Default Router*mask is displayed. For descriptions of the individual fields, see Section 7.4.1.9, "Editing a default router".

7.4.1.9 Editing a default router

You can edit the current default router settings.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP Routing > (right-click) Default Router > *Edit Default Router*

The *Default Router* mask is displayed. You can edit the following fields:

- *Default Routing via*: Select the interface for the default router (the options available are: *No interface* or *LAN*).
- *IP Address of Default Router*: Enter the IP address of the default router in this field, providing you selected *LAN* as the interface in the *Default Routing* field above.

You must select *No interface* and enter `0.0.0.0` if a default router is not to be set.

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.1.10 DNS Settings

You can display, and where applicable, edit the IP address of the DNS server. The setting is necessary for trunking with dynamic IP addresses.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > *DNS Settings*

Right-click on *DNS Settings* to display a menu with the following entries:

> Display DNS Settings
> Edit DNS Settings

7.4.1.11 Display DNS Settings

You can check the IP address currently set for the DNS server.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > (right-click) DNS Settings > *Display DNS Settings*

The *DNS Settings* mask is displayed. For descriptions of the individual fields, see Section 7.4.1.12, "Edit DNS Settings".

7.4.1.12 Edit DNS Settings

You can set the IP address of the DNS server.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP Routing > (right-click) DNS Settings > *Edit DNS Settings*

The *Default Settings* mask is displayed. You can edit the following fields:

- *IP Address of DNS Server*: In this field, enter the IP address of the DNS server.

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.1.13 Address Resolution Protocol

For verification purposes, you can display the Address Resolution Protocol (ARP) data.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > *Address Resolution Protocol*

Right-click *Address Resolution Protocol* to display a menu containing the following entries:

> Display Address Resolution Protocol

7.4.1.14 Display Address Resolution Protocol

You can display the Address Resolution Protocol (ARP) data in a table.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > (right-click) Address Resolution Protocol > *Display Address Resolution Protocol*

The *Address Resolution Protocol* mask is displayed.

7.4.1.15 ICMP Request

For verification purposes, you can execute ping and traceroute commands to check the routing function.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > *ICMP Request*

Double-click *ICMP Request* to display the following entries in the tree structure:

> ping
> Traceroute

7.4.1.16 ping

You can execute ping commands for verification purposes to check the routing function between the HG 1500 and a random destination address.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > (double-click) ICMP Request > *Ping*

Right-click *Ping* to display a menu containing the following entries:

> Pinging

7.4.1.17 Pinging

You can start the ping command to test the routing function.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP Routing > (double-click) ICMP Request > (right-click) ping > *Execute Ping*

The *Ping* mask is displayed. You can edit the following fields:

- *Destination Address*: Enter the IP address of the destination that is to be pinged by HG 1500.
- *Number of Echo Requests to Send*: Specify how many packet requests should be exchanged. The usual values are 3 or 4.

Click *Send* or *Send (in a separate window)*.

The result of the ping request is displayed.

The following buttons are provided in the output area:
Smaller reduces the font size in the output.
Bigger increases the font size in the output.
Reload repeats the ping request.

7.4.1.18 Traceroute

For verification purposes, you can execute traceroute commands to check the routing function.

WBM path:

WBM > Explorers > Routing > (double-click) IP Routing > (double-click) ICMP Request > *Traceroute*

Right-click *Traceroute* to display a menu containing the following entries:

> Executing Traceroute

7.4.1.19 Executing Traceroute

You can start the Traceroute command to test the routing function.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP Routing > (double-click) ICMP Request > (right-click) Traceroute > *Execute Traceroute*

The *Traceroute* mask is displayed. You can edit the following fields:

- *Destination Address*: Enter the IP address of the destination. The traceroute between the HG 1500 and this destination address is determined.
- *TOS Byte*: Specify whether TOS bytes (TOS = Type of Service) are to be sent. TOS bytes provide information on the quality of a service.

Click *Send* or *Send (in a separate window)*.

The result of the traceroute request is displayed.

The following buttons are provided in the output area:
Smaller reduces the font size in the output.
Bigger increases the font size in the output.
Reload repeats the traceroute request.

7.4.2 IP mapping

This function allows you to configure up to 20 IP address pairs. With these specifications, IP addresses are exchanged between the internal LAN and the (external) interface when performing routing with appropriately parameterized partners at the PPP or DSL interface (IP mapping enabled).

As a result, multiple IP networks with the same addresses, for example, can be reached if these networks are accessed via a HG 1500.

WBM path:

WBM > Explorers > Routing > *IP Mapping*

Right-click *IP Mapping* to display a menu containing the following entries:

> Display IP Mapping Netmask
> Edit IP Mapping Netmask
> Adding an IP map
> IP Map Table Editor

IP Mapping (folder):

If IP maps have already been added (see Section 7.4.2.3, "Adding an IP map"), *IP Mapping* is displayed as an expandable folder. In this case, double-click *IP Mapping* in the tree structure to view the configured IP maps. Right-click a directory or bullet point to display a menu containing the following entries:

> Display IP Map
> Editing an IP map
> Deleting an IP map

7.4.2.1 Display IP Mapping Netmask

You can view the masking IP for IP mapping.

WBM path:

WBM > Explorers > Routing > (right-click) IP mapping > *Display IP Mapping Netmask*

The *IP Mapping* mask containing the netmask is displayed.

7.4.2.2 Edit IP Mapping Netmask

The network mask defines which part of an IP address is mapped when translating to the destination IP address. The unmasked address part is transferred directly to the destination address. You can edit the masking IP for IP mapping.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (right-click) IP mapping > *Edit IP Mapping Netmask*

The *IP Mapping* mask is displayed. You can edit the following field:

- *IP Mapping Netmask*: Specify a valid netmask.

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.2.3 Adding an IP map

This function allows you to create a new IP map.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (right-click) IP mapping > *Add IP Map*

The *Add IP Map* mask is displayed. You can edit the following fields:

- *Global Address*: In this field, enter the IP address for reaching HG 1500 from an external location.
- *Local IP Address*: Enter the IP address of the LAN in this field. Packets that reach HG 1500 via the global address specified above are forwarded to this local address.

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.2.4 IP Map Table Editor

The IP Map Table Editor allows you to edit all existing and new IP maps at once.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (right-click) IP mapping > *IP Map Table Editor*

A separate window containing the Table Editor is displayed. Each line in the table represents an IP map. For descriptions of the individual fields, see Section 7.4.2.3, "Adding an IP map". For information on how to use the Table Editor, see Section 3.2.5, "Table Editor".

7.4.2.5 Display IP Map

You can view details on an IP map provided you have already created IP maps (see Section 7.4.2.3, "Adding an IP map").

WBM path:

WBM > Explorers > Routing > (double-click) IP mapping > (right-click) selected IP map > *Display IP Map*

The *IP Mapping* mask is displayed. For descriptions of the individual fields, see Section 7.4.2.3, "Adding an IP map". You can see the same data in the Explorer list associated with the existing IP maps. The entries here are specified in the format *Global IP <local IP>*.

7.4.2.6 Editing an IP map

You can edit details on an IP map provided you have already created IP maps (see Section 7.4.2.3, "Adding an IP map").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP mapping > (right-click) selected IP map > *Edit IP Map*

The *IP Mapping* mask is displayed. For descriptions of the individual fields, see Section 7.4.2.3, "Adding an IP map".

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.2.7 Deleting an IP map

This option allows you to delete existing IP maps (see Section 7.4.2.3, "Adding an IP map").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) IP mapping > (right-click) selected IP map > *Delete IP Map*

The *Delete Static Route* mask is displayed. The global address of the IP map to be deleted is displayed for verification.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.3 NAT

This function conceals non-public (internal) IP addresses. These addresses are not forwarded to the Internet. PCs are thus invisible to the Internet as the data is exchanged completely via NAT.

The internal company LAN appears as a single IP address to the Internet. All access operations between the LAN and the Internet are processed via this address and various port numbers. At the same time this prevents any IP connection attempts (including attacks) from the Internet to the corporate LAN. Only connections released with the Explorer function "NAT" can be reached from the Internet.

WBM path:

WBM > Explorers > Routing > *NAT*

Right-click *NAT* to display a menu containing the following entries:

> Add NAT
> NAT Table Editor

NAT (folder):

If NAT entries have already been added (see Section 7.4.3.1, "Add NAT"), *NAT* is displayed as an expandable folder. In this case, double-click *NAT* in the tree structure to view the configured NAT entries. Right-click a NAT entry (the local IP address is shown) to display a menu containing the following entries:

> Display NAT
> Edit NAT
> Delete NAT

7.4.3.1 Add NAT

You can add a NAT mask for network address translation.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (right-click) NAT > *Add NAT*

The *Add NAT* mask is displayed. You can edit the following fields:

- *Local IP Address*: Enter the local destination address in the internal corporate LAN in this field.
- *Local Port*: Enter the local port number of the protocol set in the internal corporate LAN.
- *Global Port*: Enter the port number of the HG 1500 protocol set.

- *Protocol*: Select the transport protocol to be used (TCP or UDP).

> The set transport protocol applies both for local and global addresses.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.3.2 NAT Table Editor

The NAT Table Editor allows you to edit all existing and new NAT entries at once for network address translation.

WBM path:

WBM > Explorers > Routing > (right-click) NAT > *NAT Table Editor*

A separate window containing the Table Editor is displayed. Each line in the table represents an NAT entry. For descriptions of the individual fields, see Section 7.4.3.1, "Add NAT". For information on how to use the Table Editor, see Section 3.2.5, "Table Editor".

7.4.3.3 Display NAT

You can view details on a NAT entry provided you have already created NAT entries (see Section 7.4.3.1, "Add NAT").

WBM path:

WBM > Explorers > Routing > (double-click) NAT > (right-click) selected local IP address > *Display NAT*

The *NAT* mask is displayed. For descriptions of the individual fields, see Section 7.4.3.1, "Add NAT".

7.4.3.4 Edit NAT

You can edit details on a NAT entry provided you have already created NAT entries (see Section 7.4.3.1, "Add NAT").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) NAT > (right-click) selected local IP address > *Edit NAT*

The *NAT* mask is displayed. For descriptions of the individual fields, see Section 7.4.3.1, "Add NAT".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.3.5 Delete NAT

You can delete created NAT entries (see Section 7.4.3.1, "Add NAT").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) NAT > (right-click) selected local IP address > *Delete NAT*

The *Delete NAT* mask is displayed. The local IP address of the entry is displayed for verification.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4 PSTN

PSTN stands for **P**ublic **S**witched **T**elephone **N**etwork, in other words, for the public telephone network.

Partners that you want to reach via analog or ISDN connections must be configured as PSTN peers. A router call number is generally used to dial into the corporate network. The peer is identified via the station number transferred. A unique MSN must be configured for every peer who does not transfer a station number and this MSN must be dialed instead of the router call number.

HG 1500 uses the point-to-point protocol (PPP) for transporting IP packets via analog or ISDN connections.

WBM path:

WBM > Explorers > Routing > *PSTN*

Right-click *PSTN* to display a menu containing the following entries:

> Display Global PSTN Data
> Edit Global PSTN Data

PSTN (folder):

Double-click *PSTN* in the tree structure to manage the PPP log and individual PSTN peers. The following entries are listed:

> PPP Log
> PSTN peers

7.4.4.1 Display Global PSTN Data

You can view the HG 1500 basic PSTN configuration data for station number, redial, and scripting.

WBM path:

WBM > Explorers > Routing > (right-click) PSTN > *Display Global PSTN Data*

The *PSTN Global Data* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.2, "Edit Global PSTN Data".

7.4.4.2 Edit Global PSTN Data

You can edit the HG 1500 basic PSTN configuration data for station number, redial, and scripting.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (right-click) PSTN > *Edit Global PSTN Data*

The *PSTN Global Data* mask is displayed. You can edit the following fields:

- *Router Call Number*: Select the HiPath 3000 DID from the pop-up menu. All applications that use the router function can be reached from an external location via this DID number. External routing partners that do not transfer a station number must each use different call numbers. These station numbers are configured as MSNs.
- *Number of Redial Attempts*: Enter the number of redial attempts that should be made by HG 1500 to set up a connection.
- *Pause between Redial Attempts (sec)*: Enter the times between redial attempts in seconds.
- *Identification of User 1 for Scripting*: Enter the first part of the ID for logging on to Internet providers (see example below).
- *Identification of User 2 for Scripting*: Enter the second part of the ID for logging on to Internet providers (see example below).
- *New Password for Scripting*: Enter the password for logging on to Internet providers (see example below).

Example:

The Internet provider requires host, user identification and password entries: Host=ERT005, User=KJUMBERT, Password=123456.

The entries are as follows:
Identification of User 1 for Scripting: `HOST:ERT005`
Identification of User 2 for Scripting: `USER:KJUMBERT`
New Password for Scripting: `PASSWORD:123456`

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.3 PPP Log

You can load the PPP log file of the gateway via HTTP and delete it on the gateway. The log file contains data on PAP or CHAP authentication errors. If the log file was deleted, it is automatically recreated and described.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > *PPP Log*

Right-click *PPP Log* to display a menu containing the following entries:

> Load via HTTP
> Clear PPP Log

7.4.4.4 Load via HTTP

You can load the gateway's PPP log file via HTTP.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > (right-click) PPP Log > *Load via HTTP*

You must confirm the advisory message that appears with *OK*. Depending on your browser settings, another dialog may now appear in which you can decide if you want to save the downloaded log file or open it directly in the default editor.

7.4.4.5 Clear PPP Log

You can delete the PPP log file from the gateway machine.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (right-click) PPP Log > *Clear PPP Log*

An important warning is displayed.

Click *Delete Log* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.6 PSTN peers

Up to 70 peers can be configured. Each setting describes a PSTN peer that dials into the corporate network via the HiPath 3000 or can be reached from the corporate network. The router call number is generally used to dial into the corporate network. The station number transferred is checked during this operation. If a station number is not transferred, an MSN can be configured for a PSTN peer as the dial-in number.

A default PSTN peer is preconfigured. These default settings appear in the input mask whenever a new peer is configured. By changing the factory settings of the default PSTN peer, you can create your own customized template for data records.

The icons for the default PSTN peer and its station number are displayed in blue.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > *PSTN Peers*

Right-click *PSTN Peers* to display a menu containing the following entries:

> Add PSTN Peer

PSTN Peers (folder):

Double-click *PSTN Peers* in the tree structure to manage individual PSTN peers and the default PSTN peer. Every entry under *PSTN Peer* refers to a configured PSTN peer. Right-click a PSTN peer that you have configured yourself (see also Section 7.4.4.8, "Add PSTN Peer") to display a menu containing the following entries:

> Display PSTN Peer
> Edit PSTN Peer
> Delete PSTN Peer
> Adding a station number

Right-click Default PSTN Peer to display a menu containing the following entries:

> Display Default PSTN Peer
> Edit Default PSTN Peer
> Reset to Factory Default

[PSTN Peer Name] (folder):

If a station number has already been added (see also Section 7.4.4.12, "Adding a station number") for a PSTN peer that you have configured yourself (see also Section 7.4.4.8, "Add PSTN Peer"), the PSTN Peers entry will be displayed as an expandable folder. Double-click the PSTN peer name to open the folder. Every entry under the open folder refers to a station number assigned to the PSTN peer. Right-click a station number to display a menu containing the following entries:

> Display Call Address
> Edit Call Address
> Delete Call Address

7.4.4.7 Default PSTN Peer

The default PSTN peer is also a specially colored expandable folder. Double-click *Default PSTN Peer* to open the folder. The following entry is displayed:

> Default Station Number

Right-click *Default PSTN Peer* to display a menu containing the following entries:

> Display Default PSTN Peer
> Edit Default PSTN Peer
> Reset to Factory Default

7.4.4.8 Add PSTN Peer

You can create a new PSTN peer.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (right-click) PSTN peers > *Add PSTN Peer*

The *Add PSTN Peer* mask is displayed. You can edit the following fields:

- *Peer Name*: Enter a name of your choice for the PSTN peer. The field can contain up to 14 characters.
- *PSTN Connection Type*: Select whether the PSTN connection is to be used (option *Active*). You can preconfigure the PSTN peer if you select *Not configured*. However, this setting prevents a connection being set up over this PSTN peer.

> The options *Default Router*, *Internet Access with DNS Request*and *NAT* (see below for descriptions) can only be enabled for **one** active PSTN peer.

IP Parameters :

- *IP Address of PSTN Peer*: Enter the IP address of the PSTN peer in this field. If this PPP connection is used for Internet access, this entry is only necessary if the Internet Service Provider uses a static IP address.
- *IP Address of Local PSTN Interface*: Enter the IP address of the local PSTN interface in this field. If this PPP connection is used for Internet access, this entry is only necessary if the Internet Service Provider assigned you a static IP address.
- *Maximum Data Packet Size (Byte)*: Enter the maximum packet length in bytes for the IP protocol. The value range lies between 576 and 1500 bytes.
- *Negotiate IP Address*: Select how the HG 1500 and PSTN peer should negotiate the IP address at connection setup.

General PPP Parameters:

- *MSN-/DUWA-Nummer*: In diesem Feld können Sie eine MSN-Nummer konfigurieren.

> Übermittelt der Partner seine Rufnummer, so muss diese konfiguriert sein, sonst wird der Ruf abgewiesen. Sind hingegen Rufnummern des Partners konfiguriert, aber der Partner übermittelt keine, so kommt die Verbindung trotzdem zustande.

- *Default Router*: Activate this option if you want to preconfigure the PSTN peer configured as well as use it as a routing destination. Please note that you can only have one default router: this is either the DSL access – see also Section 7.3.3, "LAN2 ([not used])" – or the PSTN peer set up here.
- *Internet Access with DNS Request*: Specify if you want to use the access for Internet access. Note that only one Internet access may be activated per HiPath 3000/5000 V8 - HG 1500 V8 (either one PSTN peer or one DSL connection).
- *Service Entry*: Specify whether the station number check function should be deactivated when calling the MSN of the PSTN peer. This is the case if the "Service Entry" function is activated. The Service Entry function can only be activated if the PSTN peer has an MSN number and a PAP or CHAP authentication has been activated.
- *MSN/DID Number*: You can configure an MSN number in this field.

> If the peer sends his station number without it being configured, the call will be rejected. If, however, the peer's station numbers have been configured but are not transmitted, the connection will still be set up.

- *B Channels*: Enter the number of B channels used.

- *Callback*: Specify whether a call should be rejected and followed immediately by a callback. This prevents unauthorized peers from dialing in. The calling station must use the ISDN connection's D channel to transfer the station number and must permit dial-in via HG 1500. This station number must be configured for the outgoing direction at the PSTN peer.

> ⓘ If callback is enabled, only outgoing connections from this peer are accepted. A connection cannot be set up if the peer is also a gateway and if callback is also enabled for this connection because neither of the peers accept incoming connection setup. In the case of a faulty configuration where only callback without redial is enabled, this can be detected and continuous connection setup can be suppressed. However, the problem is not detected if redial is enabled.

- *V.34 Peer*: Specify if a V.34 peer (e.g. a modem) should be accepted.
- *V.110 Peer*: Specify if a V.110 peer (e.g. GSM) should be accepted.
- *Automatic PPP Connection*: Specify if the PPP connection should be automatically established at system startup.
- *Automatic PPP Reconnection*: Specify if the PPP connection should be automatically re-established after a connection cleardown (for example, in the case of ISP access with flat rate and forced cleardown after 24 hours).
- *PPP Default Header*: Specify whether the "default header" should be transferred for the recipient.
- *Scripting*: Specify if scripting should be active (see also Section 7.4.4.1, "Display Global PSTN Data").
- *Send LCP Echo Request*: Specify if an LCP echo request should be sent. This function is used to check if the connection is still active.

Short Hold:

- *Short Hold*: Specify if the "Short Hold" operating mode should be activated or deactivated for the PPP connection. The following entries are only possible when short-hold mode is active:
  - *Short Hold Time (sec)*: Enter the length of time during which no data is transmitted after which the PPP connection should be cleared down. The permitted value range lies between 10 and 9999 seconds. The short-hold timer is only triggered by outgoing packets (HG 1500 to the PSTN peer).
  - *Short Hold Charge Pulse Analysis*: Specify whether short-hold mode should be optimized taking the charge pulse into consideration. Charge pulse analysis is performed for calls over PPP (evaluation of facility messages with AoC info elements). If the Internet service provider does not supply call charge information, then the default timeout value is set to 0 seconds.

Authentication:

- *PPP Authentication*: Specify whether authentication should be performed. The parameter mask is extended if this check box is selected:
  - *PAP Authentication Mode*: Specify which type of authentication should be used for the PPP connection (*PAP Client*, *PAP Host*, *not used*).
  - *PAP Password*: Specify the password to be entered by the user for identification in the case of PAP authentication. Data cannot be entered in the field if PAP authentication is not used.
  - *CHAP Authentication Mode*: Specify which type of authentication should be used for the PPP connection (*CHAP Client*, *CHAP Host*, *CHAP* Symmetric *not used*).
  - *CHAP Password*: Specify the password to be entered by the user for identification in the case of CHAP authentication. Data cannot be entered in the field if CHAP authentication is not used.
  - *PPP User Name*: Enter a user name of your choice that should be used for authentication via PAP or CHAP.

The following table shows the configurations permitted. For authentication, "client" partners must always authenticate themselves at the "host" partner.

CHAP Configuration		
HG 1500	**Teleworker PC or HG 1500**	**Connection**
CHAP: not used	CHAP: not used	active, without authentication
CHAP: not used	CHAP Client	active, with authentication
CHAP: not used	CHAP Host	Inactive
CHAP: not used	CHAP Symmetric	Inactive
CHAP:Client	CHAP: not used	active, with authentication
CHAP:Client	CHAP Client	active, with authentication
CHAP:Client	CHAP Host	active, with authentication
CHAP:Client	CHAP Symmetric	Inactive
CHAP:Host	CHAP: not used	Inactive
CHAP:Host	CHAP Client	active, with authentication
CHAP:Host	CHAP Host	Inactive
CHAP:Host	CHAP:Symmetric	Inactive
CHAP:Symmetric	CHAP: not used	Inactive
CHAP:Symmetric	CHAP Client	Inactive

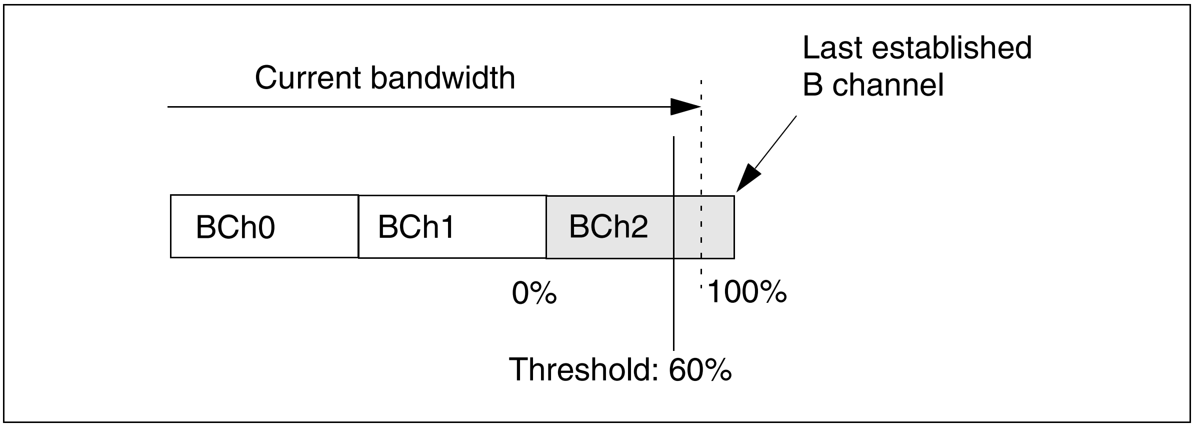
Table 7-2 PAP and CHAP Configuration Options

CHAP:Symmetric	CHAP Host	Inactive
CHAP:Symmetric	CHAP:Symmetric	active, with authentication
PAP Configuration		
HG 1500	**Teleworker PC or HG 1500**	**Connection**
PAP: not used	PAP: not used	without authentication
PAP: client	PAP: host	with authentication
PAP: host	PAP: client	with authentication

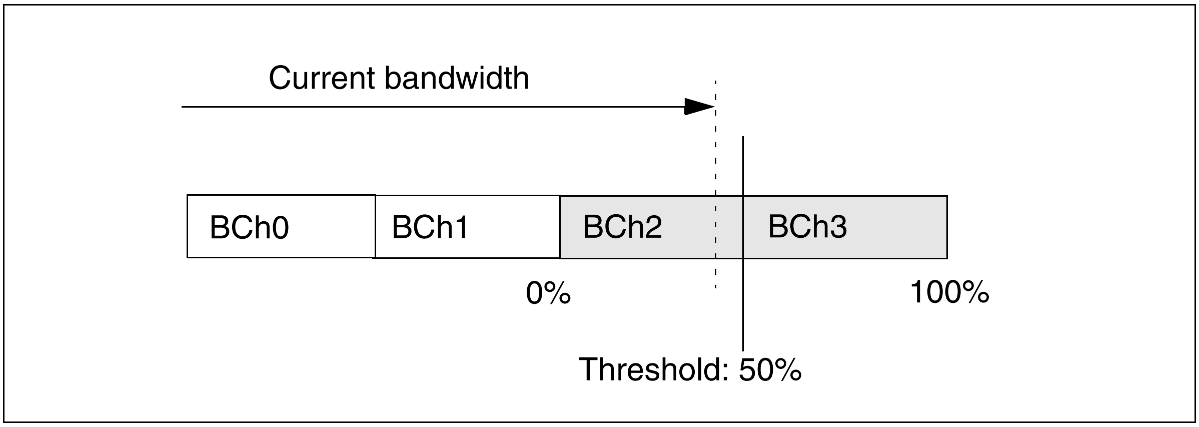
Table 7-2 PAP and CHAP Configuration Options

Multi-Link:

- *Multi-Link*: Specify whether channel bundling should be enabled on this PPP connection. The following inputs can only be made when multi-link is activated:
  - *Channel Allocation Mode*: Specify whether channel allocation should be static or dynamic for this PPP connection.
    In the case of static channel allocation, the required number of channels is established at the start of the connection (see General PPP Parameters: B Channels). If the required number of system-routed B Channels is not available (for example, because seized by calls), only the maximum available number of B channels is established. B channels that subsequently become free can no longer be added to this multi-link connection. A completely new connection must be established for this.
    In the case of dynamic channel allocation, additional B channels are established or allocated B channels are cleared down depending on the bandwidth used. The maximum number of B channels required for this multi-link connection is set in the "B Channels" field under General PPP Parameters. As in the case of static multi-link, the number of B channels available may also be less than required here. In contrast to static multi-link, however, B channels that become free can be used for the multi-link connection if the current bandwidth requirement is high enough. B channel establishment and cleardown can be controlled by setting the upper and lower multi-link threshold and the upper and lower multi-link time limit.
    The number of B Channels currently seized can be checked under Device Statistics (see Section 7.8.1, "Device Statistics").
  - *Segmentation*: If you enable this option, IP packets are split into multiple fragments. The fragments are transmitted over various B channels in a multi-link connection and reassembled into the original IP packets on the receive side. The activation of segmentation leads to shorter transmission times for IP packets and more consistent B channel utilization. Segmentation should be enabled for voice data transmission in multi-link connections to reduce jitter and therefore improve voice quality.
  - *Upper Multi-Link Threshold (%)*: This value specifies the upper threshold above which an extra B channel is added. The threshold is based on the calculated utilization of the last B channel established. The permitted value range lies between 51% and 100%.



- *Upper Multi-Link Time Limit (sec)*: Specify the length of time for which the transmission rate must exceed the highest level before another B channel will be added (channel bundling). The permitted value range lies between 10 and 60 seconds.
- *Lower Multi-Link Threshold (%)*: This value specifies the lower threshold below which a B channel is cleared down. The threshold is based on the calculated utilization of the last two B channels cleared down. The permitted value range lies between 20% and 80%.



- *Lower Multi-Link Time Limit (sec)*: Specify the length of time for which the transmission rate must fail to reach the lowest level before an additionally switched B channel will be deactivated. The permitted value range lies between 10 and 60 seconds.

Header Compression:

- *IP Header Compression*: Specify whether IP/TCP or IP/UDP/RTP headers should be compressed. Header compression improves data transmission in Voice-over-PPP scenarios. All voice packets with UDP port numbers in the set range are compressed (see Section 7.7.4.2, "Editing MSC settings").

Data Compression:

The STAC and MPPC compression algorithms are available for compressing PPP data packets. STAC is widely used in the UNIX world, while MPPC is the Microsoft alternative. Both algorithms offer similar compression results. MPPC features a more robust resynchronization mechanism to deal with packet loss and is the preferred option if transmission quality is low. Please note that pre-compressed data (.ZIP files) and files containing binary data (for example, audio/video files, *.exe files, etc.) cannot be compressed further and thereby transmitted quicker.

- *STAC Data Compression*: Specify whether STAC should be used for data compression.
- *MPPC Data Compression*: Specify whether MPPC should be used for data compression.

Address Translation:

- *NAT*: Specify whether the "Network Address Translation (NAT)" function should be disabled or enabled. The active function supports the following protocols: TCP, UDP, and ICMP (only in passive mode).
- *IP Mapping*: Specify whether the "IP Mapping" function should be disabled or enabled.

> A maximum of one of the two options should be activated because NAT and address mapping cannot be set simultaneously.

QoS Parameters of Interface:

- *Bandwidth Control for Voice Connections*: Bandwidth control prevents the transmission rates available from being overbooked with voice connections within a multi-link connection. In other words, when header compression is active, a maximum of five voice connections (G.729/60 msec or G.723/60 msec) is permitted over a B channel. Select this check box if you want to activate the "Bandwidth Control for Voice Connections" function. Only voice connections with routes configured in the voice gateway are considered here (see Section 7.5, "Voice Gateway").
- *Bandwidth Used for Voice/Fax (%)*: Specify the percentage of bandwidth that should be used for voice/fax connections. (see also Section 9.3, "Quality of Service (QoS)").
- *QoS Capability of Peer*: Enter the "Quality of Service (QoS)" that is supported by the other party (Identical, DiffServ or IP Precedence). See also Section 9.3, "Quality of Service (QoS)".

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

An advisory is also displayed if you modified the contents of the *PSTN Connection Type* field and must be confirmed with OK.

7.4.4.9 Display PSTN Peer

You can view details associated with a IP peer if have you have already created IP peers (see Section 7.4.4.8, "Add PSTN Peer").

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (right-click) selected PSTN peer > *Display PSTN Peer*

The *PSTN Peer* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.8, "Add PSTN Peer".

7.4.4.10 Edit PSTN Peer

You can edit details associated with a IP peer if have you have already created IP peers (see Section 7.4.4.8, "Add PSTN Peer").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (right-click) selected PSTN peer > *Display PSTN Peer*

The *PSTN Peer* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.8, "Add PSTN Peer".

When all settings are complete, click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

An advisory is also displayed if you modified the contents of the *PSTN Connection Type* field and must be confirmed with OK.

7.4.4.11 Delete PSTN Peer

You can delete an existing IP peer if have you have already created IP peers (see Section 7.4.4.8, "Add PSTN Peer").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (right-click) selected PSTN peer > *Delete PSTN Peer*

The *Delete PSTN Peer* mask is displayed. This shows the name of the PSTN peer, its IP address, and the IP address of the local interface for the connection for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.12 Adding a station number

Up to five call numbers can be configured for each PSTN peer. A station number is checked as it is being transferred, and calls are only accepted if a PSTN peer is assigned appropriate call authorization for the incoming station number.

If general dialing parameters are configured (see Section 7.4.5, "Dialing Parameters"), these are evaluated during configuration and station number checking. All call numbers are converted into the lowest implicit format.

Example:

The following general Dialing Parameters are used:

International prefix= 000	Country code = 49
National prefix = 00	Prefix = 89
Prefix for trunk access = 0	Connection number = 722

Irrespective of the format of the station number transferred ("0722 123" or "0089722123" or "000 49 89 722 123"), all are changed to "123" as the lowest implicit format.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (right-click) selected PSTN peer > *Add Station Number*

The *Add PSTN Station Number* mask is displayed. You can edit the following entries:

- *Station Number*: Enter the station number at which a PSTN peer can be reached. It must be unique within the entire configuration and can comprise up to 22 decimal digits (0 to 9). Hyphens are permitted.
- *Direction*: Enter the type of connection that can be set up using this station number.
  - *Blocked*: The number cannot be used.
  - *Incoming*: The peer may make calls but may not be called.
  - *Outgoing*: The peer may be called but may not make calls.
  - *Incoming and Outgoing*: The peer may make calls and be called.

Click *Apply*. You must confirm the advisory message that appears with *OK*. You must also click *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.13 Display Call Address

You can check the call address associated with a PSTN peer and its direction.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (double-click) selected PSTN peer > (right-click) selected station number > *Display Station Number*

The *PSTN Station Number* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.12, "Adding a station number".

7.4.4.14 Edit Call Address

You can edit a call address associated with a PSTN peer and its direction.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (double-click) selected PSTN peer > (right-click) selected station number > *Edit Station Number*

The *PSTN Station Number* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.12, "Adding a station number".

Click *Apply*. You must confirm the advisory message that appears with *OK*. You must also click *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.15 Delete Call Address

You can delete the assignment of a call address to a PSTN peer.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (double-click) selected PSTN peer > (right-click) selected station number > *Delete Station Number*

The *Delete PSTN Station Number* mask is displayed. The call address is displayed for verification.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.16 Display Default PSTN Peer

You can view the current settings for the default PSTN peer.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (right-click) Default PSTN Peer > *Display Default PSTN Peer*

The *Default PSTN Peer* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.8, "Add PSTN Peer".

7.4.4.17 Edit Default PSTN Peer

You can edit the current settings for the default PSTN peer.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (right-click) Default PSTN Peer > *Edit Default PSTN Peer*

The *Default PSTN Peer* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.8, "Add PSTN Peer".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.18 Reset to Factory Default

You can reset the default PSTN peer settings. However, this does not affect the assigned station number. You can reset these separately to the factory defaults – see Section 7.4.4.22, "Reset to Factory Default".

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (right-click) Default PSTN Peer > *Reset to Factory Default*

Please note the warning displayed. Finally, click *Reset to Factory Default* and *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.19 Default Station Number

This option allows you to manage the default station number of the default PSTN peer.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (double-click) Default PSTN Peer > *Default Station Number*

Right-click *Default Station Number* to display a menu containing the following entries:

> Display Default Station Number
> Edit Default Station Number
> Reset to Factory Default

7.4.4.20 Display Default Station Number

You can view the default station number and the assigned direction of the default PSTN peer.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (double-click) Default PSTN Peer > (right-click) Default Station Number > *Display Default Station Number*

The *Default PSTN Station Number* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.12, "Adding a station number".

7.4.4.21 Edit Default Station Number

You can edit the default station number and the assigned direction of the default PSTN peer.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (double-click) Default PSTN Peer > (right-click) Default Station Number > *Edit Default Station Number*

The *Default PSTN Station Number* mask is displayed. For descriptions of the individual fields, see Section 7.4.4.12, "Adding a station number".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.4.22 Reset to Factory Default

You can reset the default station number settings for the default PSTN peer. However, this only affects the assigned station number. You can reset the basic settings for the default PSTN peer separately to the factory defaults – see Section 7.4.4.18, "Reset to Factory Default".

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (double-click) PSTN peers > (double-click) Default PSTN Peer > (right-click) Default Station Number > *Reset to Factory Default*

Please note the warning displayed. Finally, click *Reset to Factory Default* and *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.5 Dialing Parameters

The direct inward dialing numbers configured with the aid of theHiPath 3000 Manager E as S_0 stations in HiPath 3000 can be assigned to a VCAPI client, the MSN/DID number of a PSTN peer or the router call number inHG 1500. The dialing parameters can be configured via WBM. Configured subscribers and IP addresses can also be viewed.

WBM path:

WBM > Explorers > Routing > *Dialing Parameters*

Right-click *Dialing Parameters* to display a menu containing the following entries:

> Display General Dialing Parameters
> Edit General Dialing Parameters

Dialing Parameters (folder):

Double-click *Dialing Parameters* in the tree structure to display the following entries:

> Configured Subscribers
> Configured IP Addresses

7.4.5.1 Display General Dialing Parameters

You can display the basic settings.

WBM path:

WBM > Explorers > Routing > (double-click) PSTN > (right-click) Dialing Parameters > *Display General Dialing Parameters*

The *General Dialing Parameters* mask is displayed. For descriptions of the individual fields, see Section 7.4.5.2, "Edit General Dialing Parameters".

7.4.5.2 Edit General Dialing Parameters

You can edit the basic settings. Configuration is optional.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Routing > (double-click) PSTN > (right-click) Dialing Parameters > *Edit General Dialing Parameters*

The *General Dialing Parameters* mask is displayed. You can edit the following fields:

- *Confirm CLIR*: This is a security function. Select this checkbox to prevent a caller number marked as private from being forwarded to the LAN. The background to this option is that the CLIR functionality is not explicitly defined for IP routing in LANs because the terminal interface to the public network does not match the type found in classic telephony.

E.164

- *International Prefix*: The prefix for international numbers (including the trunk access digit).
- *National Prefix*: The prefix for national calls (including the trunk access digit).
- *Subscriber Prefix*: The trunk access digit or the prefix for calls to the public telephone network.
- *Country Code*: The country ID for the location of the HG 1500.
- *Area Code*: The area code for the location of the HG 1500.
- *Location Code*: The location code for the HG 1500 (if available).

Example:

In HiPath 3000, 0 is configured as the trunk access digit. The system is located in Munich and its connection number is 722:

International prefix= 000	Country code = 49
National prefix = 00	Prefix = 89
Prefix for trunk access = 0	Connection number = 722

> Station number analysis is exclusively performed by the HiPath 3000/5000 V8 - HG 1500 V8 on the basis of the dialing parameters configured here and irrespective of any other corresponding HiPath 3000 parameters. You must explicitly ensure that the numbering scheme used for the HiPath 3000/5000 V8 - HG 1500 V8 is set up in accordance with the relevant configuration of the HiPath 3000.
> Based on the above example, this means:
> If the HiPath 3000 signals the HG 1500 using the implicit station number format with exchange code 0, the prefix for trunk access must also be set to 0 in the dialing parameters. In the example, the national prefix is set to 00 and the international prefix is 000. In both cases, the first 0 stands for the trunk access code.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.4.5.3 Configured Subscribers

These are configured S_0 subscribers.

WBM path:

WBM > Explorers > Routing > (double-click) Dialing Parameters > *Configured Subscribers*

Right-click *[Configured Subscribers* to display a menu containing the following entries:

> Display Configured Subscribers

7.4.5.4 Display Configured Subscribers

You can display a list of configured subscribers.

WBM path:

WBM > Explorers > Routing > (double-click) Dialing Parameters > (right-click) Configured Subscribers > *Display Configured Subscribers*

The *Configured Subscribers* mask is displayed. The station numbers and subscriber types are listed in a table. Subscriber types are, for example, HFA system clients, H.323 clients (with IP address) or PSTN peers.

7.4.5.5 Configured IP Addresses

These addresses are the IP addresses of, for example, the LAN interfaces, the individual subscribers or the PSTN peers.

WBM path:

WBM > Explorers > Routing > (double-click) Dialing Parameters > *Configured IP Addresses*

Right-click *Configured IP Addresses* to display a menu containing the following entries:

> Display Configured IP Addresses

7.4.5.6 Display Configured IP Addresses

You can display a list of the relevant IP addresses.

WBM path:

WBM > Explorers > Routing > (double-click) Dialing Parameters > (right-click) Configured Subscribers > *Display Configured IP Addresses*

The *Configured IP Addresses* mask is displayed. The IP addresses and subscriber types are listed in a table. Subscriber types are, for example, LAN interfaces or PSTN peers.

The entries can be sorted. An arrow after a column name indicates the sort criterion. If you wish to sort the table by another column, click the respective column name.

7.5 Voice Gateway

By supporting Voice over IP (VoIP), HG 1500 facilitates the use of HiPath 3000 features via IP networks. To enable this, general H.323 parameter settings must be made and PBX nodes and PBX routes must be configured. In addition, this function permits system clients or H.323 clients to be logged on.

WBM path:

WBM > Explorers > *Voice Gateway*

The *Voice Gateway* tree structure is displayed.

Entries under *Voice Gateway*:

> H.323 Parameters
> SIP Parameters
> Codec Parameters
> Internet Telephony Service Provider
> Destination codec parameters
> PBX
> Clients
> ISDN classmark

7.5.1 H.323 Parameters

This option allows you to view and configure settings for the H.323 protocol for voice transmission via the IP network.

WBM path:

WBM > Explorers > Voice Gateway > *H.323 Parameters*

Right-click *H.323 Parameters* to display a menu containing the following entries:

> Display H.323 Parameters
> Editing H.323 parameters

7.5.1.1 Display H.323 Parameters

This option allows you to display the settings for H.323 stack parameters.

WBM path:

WBM > Explorers > Voice Gateway > (right-click) H.323 Parameters > *Display H.323 Parameters*

The *H.323 Stack Parameters* mask is displayed.
For descriptions of the individual fields, see Section 7.5.1.2, "Editing H.323 parameters".

7.5.1.2 Editing H.323 parameters

This option allows you to edit the settings for H.323 stack parameters.

> If VoIP security is active (see Section 7.7.3, "VoIP Security Data"), the check boxes *Basic User Input String for Outband Signaling* and *User Input for DTMF Outband Signaling* cannot be edited and are set to "false“.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (right-click) H.323 Parameters > *Edit H.323 Parameters*

The *H.323 Stack Parameters* mask is displayed. You can edit the following fields:

- *Basic User Input String for Outband Signaling* This field activates and deactivates the function for "Outband Signaling (postdialing)" with H.245 user inband "String for Outbound" signaling.
- *User Input for DTMF Outband Signaling*: This field activates and deactivates the function for "Outband Signaling (postdialing)" with H.245 user inband "DTMF Outbound" signaling.
- *Time To Live for RAS registration (sec)*: Enter the timeout in seconds for RAS registration in this field.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.2 SIP Parameters

You can view and set SIP parameters for the IP network.

WBM path:

WBM > Explorers > Voice Gateway > *SIP Parameters*

Right-click *SIP Parameters* to display a menu containing the following entries:

> Display SIP Parameters
> Edit SIP Parameters

7.5.2.1 Display SIP Parameters

You can display the settings for SIP parameters.

WBM path:

WBM > Explorers > Voice Gateway > (right-click) SIP Parameters > *Display SIP Parameters*

The *SIP Parameters* mask is displayed. Parameters are described under Edit SIP Parameters.

7.5.2.2 Edit SIP Parameters

This option allows you to edit some of the settings for SIP parameters.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (right-click) SIP Parameters > *Edit SIP Parameters.*

You can edit the following fields:

SIP Transport Protocol

- *SIP via TCP*: Abbreviation for "**T**ransmission **C**ontrol **P**rotocol". Alongside IP, this is the most important Internet protocol. It provides a connection-based, reliable, full-duplex service in the form of a data channel.
- *SIP via UDP*: Abbreviation for "**U**ser **D**atagram **P**rotocol". This protocol can be used as an alternative to TCP if reliability is not important. UDP does not guarantee packet delivery nor does it ensure that packets are received in a specific sequence.

SIP Session Timer

- *Use RFC 4028*: RFC 4028 defines an expansion of the Session Initiation Protocol (SIP). This expansion allows a periodic refresh of SIP sessions. The user agents and the proxies can use the refresh to determine, whether the SIP session is still active.
- *Session Expires (sec.)*: Defines the longest duration of an SIP session. The recommended value is "1800". If possible the figure should not be below this value
- *Minimum SE (sec.)*: Defines the shortest duration of an SIP session that is allowed (specified in seconds). The smallest value allowed is "90". The value "90" is also the default value.

Provider Calls

- *Maximum possible number of callers via provider*: Number of simultaneous calls via all activated providers. The maximum number depends on the data rate to the Internet and the codec used.
  Scenario: A number of trunks, e.g. 2 is created for each activated provider, which would produce a figure of 8 trunks for 4 activated providers. If however the bandwidth is only available for 4 calls, then these parameters prevent a 5th call being set up and thereby a disruption to the payload.

Buttons

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.3 Codec Parameters

You can set and view the settings for the G.711 A-law, G.711-µ-law, G.723, G.729A, and G.729B codecs and for the T.38 Fax protocol.

Background information:

See Section 9.2, "Bandwidth Requirements in LAN/WAN Environments"

WBM path:

WBM > Explorers > Voice Gateway > *Codec Parameters*

Right-click *Codec Parameters* to display a menu containing the following entries:

> Display Codec Parameters
> Edit Codec Parameters

7.5.3.1 Display Codec Parameters

This option allows you to display the settings for codec parameters.

WBM path:

WBM > Explorers > Voice Gateway > (right-click) Codec Parameters > *Display Codec Parameters*

The *Codec Parameters* mask is displayed.
For descriptions of the individual fields, see Section 7.5.3.2, "Edit Codec Parameters".

7.5.3.2 Edit Codec Parameters

You can edit the settings for codec parameters.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (right-click) Codec Parameters > *Edit Codec Parameters*

The *Codec Parameters* mask is displayed. In the "Codec" table you can edit the following parameters for the G.711 A-law, G.711-µ-law, G.723, G.729A, and G.729AB protocols:

- *Priority:* This field contains the priority for using the codec. The priority can be set from 1 (high) to 7 (low). Assign different priorities to the codecs. In the default configuration, G.711 A law has priority 1, G.711 µ law has priority 2, G.723 has priority 5, G.729A has priority 4, and G.729AB has priority 3. G.729B and G.729 have the status "not used“.
- *Priorität:* Dieses Feld enthält die Priorität, mit der der Codec verwendet werden soll. Die Priorität kann von 1 (hoch) bis 7 (niedrig) eingestellt werden. Ordnen Sie den Codecs unterschiedliche Prioritäten zu. In der Voreinstellung hat G.711-A-law die Priorität 3, G.711-µ-law Priorität 4, G.723 Priorität 5, G.729A Priorität 2 und G.729AB Priorität 1. G.729B und G.729 haben den Status „nicht verwendet“.
- *Voice Activity Detection (VAD)* This field defines whether or not Voice Activity Detection (VAD) should be used for the relevant codec.
- *Frame Size*: You can set the sampling rate in this field. The adjustable values depend on the codecs.

T.38 Fax

- *T.38 Fax*: This field defines whether or not the T.38 Fax protocol is to be used.
- *Use FillBitRemoval*: This field defines whether or not fill bits should be deleted on sending and restored on receiving when using the T.38 Fax protocol. This makes it possible to save bandwidth.

- *Max. UDP Datagram Size for T.38 Fax*: Shows the maximum size of a T.38 UDP datagram in bytes.
- *Error Correction Used for T.38 Fax (UDP)*: This field defines which method is to be used for error correction (t38UDPRedundancy and t38UDPFEC).

> Codec G729 is identical to codec G729A, and codec G729B is identical to codec G729AB (no difference in terms of payload). Codecs G729 and G729B are therefore deactivated by default.
>
> From the perspective of H323 signaling, codecs G729 and G729A are different to codecs G729B and G729AB.
>
> Some non-HiPath H323 endpoints (Cisco GK) use the codec G729 or G729B for H323 signaling. In this case, the codecs G729 and G729B must also be used in the HiPath 3000/5000 V8 - HG 1500 V8.
> Codecs G729 and G729B can remain inactive in a HiPath-only network.

Misc.

- *ClearChannel*: A ClearChannel is an open channel, in which the terminal devices are responsible for the protocol in the channel. The parameter defines whether the ClearChannel interface functionality is to be enabled for T3/E3 connections or not.
- *Frame Size*: You can set the sampling rate in this field. Possible settings are 10, 20, 30, 40, 50, and 60 milliseconds (msec). The default setting is 20 msec.
- Transmission of Fax/Modem Tones according to RFC2833:
  Events supported: 32 to 36 and 49. For a detailed description of the standard
  see http:///www.faqs.org/rfcs/rfc2833.html
- Transmission of Dtmf Tones according to RFC2833:
  Events supported: 0 to 15. For a detailed description of the standard
  see http:///www.faqs.org/rfcs/rfc2833.html
- Redundant Transmission of RFC2833 Tones according to RFC2198:
  All tones transmitted by RFC2833 are secured according to RFC2198, provided that RFC2198 is active.
  For a detailed description of the standard see http:///www.faqs.org/rfcs/rfc2833.html and http:///www.faqs.org/rfcs/rfc2198.html

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.4 Internet Telephony Service Provider

An Internet telephony service provider (ITSP) is a Voice over IP (VoIP) provider that takes over the switching of telephone calls over the Internet.

WBM path: WBM > Explorers > Voice Gateway > *Internet Telephony Service Provider*

Ports in the customer’s firewall to be enabled

The following ports are to be enabled by the customer for Internet telephony service providers: ITSP, RTP_MIN to RTP_MAX, STUN (additionally, depending on activated provider)

Further information may be found in the Service Manual, Appendix C.

WBM path: WBM > Explorers > Basic Settings > Port management. The port list is administered in Manager E.

Internet Telephony Service Provider (folder):

Double-clicking *Internet Telephony Service Provider* displays the tree structure with the Internet telephony service providers already set up. If your provider is already included in the list of Internet telephony service providers, no further entries are needed. However check the data entered for correctness. You can edit the data using Section 7.5.4.6, "Edit Internet Telephony Service Provider".

Right click the **Internet Telephony Service Provider** folder to display a menu with the following entries:

> Add Internet Telephony Service Provider
> Display STUN configuration
> Edit STUN configuration
> Identify NAT Type

Individual Internet Telephony Service Providers

Right-click an individual Internet telephony service provider to display a menu containing the following entries:

> Display Internet Telephony Service Provider
> Edit Internet Telephony Service Provider
> Activate Internet Telephony Service Provider
> Deactivate Internet Telephony Service Provider
> Delete Internet Telephony Service Provider

7.5.4.1 Add Internet Telephony Service Provider

Enter the data of your Internet telephony service provider for Internet telephony here.

WBM path: WBM > Explorers > Voice Gateway > (right-click) Internet Telephony Service Provider > *Add Internet Telephony Service Provider*

The *Internet Telephony Service Provider* mask is displayed.

- **Provider name**:
  Name of the Internet telephony service provider.
- **Activate Provider**:
  If you activate this option, the corresponding Internet telephony service provider is enabled and the bullet point or the folder icon is shown in green. Up to four Internet telephony service providers can be active simultaneously.
- **Provider identifier in system**:
  The choices **Provider 1** through **Provider 4** are displayed.
- **Gateway Domain name**
  Enter the Gateway Domain name here.

Call number type

- **MSN**:
  Select the option **MSN** if you have ordered a point-to-multipoint connection from the Internet telephony service provider.
- **PABX number**:
  Select the option **PABX number** if you have ordered a PABX connection from the Internet telephony service provider.

Provider registrar

- **IP Address/Host Name**
  Hostname or IP address of the registrar server (e.g. sip-voice.de). If not already predefined, please request it from your service provider.
- **Port**
  Port number of the registrar server at (e.g. 5060). If not already predefined, please request it from your service provider.
- **Reregistration interval at provider (sec.)**
  interval (in seconds), at which the registration at the service provider will be repeated. A connection failure is also detected with the repeated registration at the service provider and if necessary an alternative route (via ISDN or an alternative provider) can be reserved.

  The default value is provider-dependent and should not be changed independently. If in doubt, consult your provider.

  Minimum value: 30, maximum value: 86400, sample value: 120 or 240.

- **Use Provider Registrar**
  Preset by the provider and, in general, always active.

Provider Proxy

- **IP address/Host Name**
  Hostname or IP address of the proxy server (e.g. sip-voice.de), generally identical to the provider registrar entry.
- **Port**
  Port number of the proxy server (e.g. 5060), generally identical to the provider registrar port number.

Provider Outbound Proxy

- **Use Provider Outbound Proxy**
  Set if the service provider uses an outbound proxy.
- **IP address/Host Name**
  Hostname or IP address of the outbound proxy if the service provider uses an outbound proxy.
- **Port**
  Port number of the outbound proxy if the service provider is an outbound proxy.

Provider STUN

- **Provider STUN IP Address**
  STUN IP address if the service provider is using a STUN server.
- **Provider STUN Port Number**
  STUN port number if the service provider is using a STUN server.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.4.2 Display STUN configuration

The Internet telephony provider connection is a connection that requires the individual registration of every phone number at the ITSP. ITSP client user accounts and Internet telephony phone numbers are made available by the provider after you apply for your Internet telephony access.

The dialog shows the data for configuration of the STUN client. The STUN client interrogates the STUN server on the Internet. STUN mode can be deactivated, always active or automatically activated:

- *Off* – the STUN client is deactivated.

- *Always* – the STUN client is always active.
- *Automatic* – the settings in the Internet telephony service provider’s profile are used (e.g. QSC without STUN, T-Online with STUN).

STUN (**S**imple **T**raversal of **U**DP over **N**ATs) is a simple network protocol with which firewalls and NAT routers can be detected and bypassed.

WBM path: WBM > Explorers > Voice Gateway > (right-click) Internet Telephony Service Provider > *Display STUN configuration*

The *STUN configuration* mask is displayed. For descriptions of the individual fields, see Edit STUN configuration.

7.5.4.3 Edit STUN configuration

WBM path: WBM > Explorers > Voice Gateway > (right-click) Internet Telephony Service Provider > *Edit STUN configuration*

The *STUN configuration* mask is displayed.

- **STUN Mode**:
  You can choose from the options *Off*, *Always* or *Automatic*:
  - *Off* – the STUN client is deactivated.
  - *Always* – the STUN client is always active.
  - *Automatic* – the settings in the Internet telephony service provider’s profile are used (e.g. QSC without STUN, T-Online with STUN).
- **STUN Listening Port**:
  Monitored port, used for exchanging data packets. The default port is 3478. If the STUN server is configured on another port (e.g. Sipgate = stun.sipgate.net/Port 10000), this fact is specified by the provider. The listening port remains at 0, the port specified at the active Internet telephony service provider is used.
- **Identified NAT Type**:
  The identified NAT type (full-cone NAT, restricted-cone NAT or port-restricted-cone NAT) is displayed. If symmetric NAT is identified, VoIP is not possible.
- **Time To Live (s)**:
  Indicates how long more the NAT connection will remain active.
  The STUN client always repeats its request when half of the "Time To Live" interval has elapsed. This ensures the port is kept open. If the time expires before a request has been started, the communication platform cannot be reached for incoming calls because the port is closed. Outgoing calls are possible, ongoing calls are not cleared down.

7.5.4.4 Identify NAT Type

Four type of NAT exist: full-cone NAT, restricted-cone NAT, port-restricted-cone NAT, and symmetric NAT. Only the first three NAT types are compatible with STUN. The STUN protocol does not support symmetric NAT implementation. The three supported NAT types operate as follows:

- Full-cone NAT – the NAT gateway translates internal addresses and ports into external addresses and their ports based on a static pattern. This ensures, in particular, that external hosts can set up connections to internal hosts at any time using the NAT gateway's external address.
- Restricted-cone NAT – the NAT gateway only permits contact between an external host and an internal host if the internal host previously contacted the external host.
- Port-restricted-cone NAT – permission to initiate contact is further restricted to the external port previously used to establish contact in the opposite direction.

WBM path: WBM > Explorers > Voice Gateway > (right-click) Internet Telephony Service Provider > *Identify NAT Type*

The *Identify NAT Type* mask is displayed:

- **Identified NAT Type**:
  The identified NAT type (full-cone NAT, restricted-cone NAT or port-restricted-cone NAT) is displayed. If symmetric NAT is identified, VoIP is not possible.
- **Time To Live (s)**:
  Indicates how long more the NAT connection will remain active.
- **Refresh**:
  Click this button to refresh the display.
- **Auto. Refresh**:
  If this option is active, the time (in s) until the next automatic refresh is shown.
- **Start NAT Type Detection**:
  Find out which type of NAT is permitted.

7.5.4.5 Display Internet Telephony Service Provider

You can display the settings for the selected Internet telephony service provider.

The color of the bullet point or of the folder indicates the Internet telephony service provider status:

● 📁
- Gray bullet point or yellow folder – the provider has been created but not activated.

● 📁
- Green – the provider is activated and registered. No errors have occurred.

- Orange – the provider is activated but at least one error has occurred in conjunction with the assigned users.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider (right-click) *Display Internet Telephony Service Provider*

The *Internet Telephony Service Provider* mask is displayed.
For descriptions of the individual fields, see Section 7.5.4.1, "Add Internet Telephony Service Provider".

For information on how to activate an Internet telephony service provider, see Section 7.5.4.7, "Activate Internet Telephony Service Provider".

7.5.4.6 Edit Internet Telephony Service Provider

You can edit the settings for the selected Internet telephony service provider.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider (right-click) *Edit Internet Telephony Service Provider*

The *Internet Telephony Service Provider* mask is displayed.
For descriptions of the individual fields, see Section 7.5.4.1, "Add Internet Telephony Service Provider".

For information on how to activate an Internet telephony service provider, see Section 7.5.4.7, "Activate Internet Telephony Service Provider".

7.5.4.7 Activate Internet Telephony Service Provider

Only four Internet telephony service providers can be active simultaneously. An active Internet telephony service provider is indicated by a green bullet point or a green folder.

The color of the bullet point or of the folder indicates the Internet telephony service provider status:

- Gray bullet point or yellow folder – the provider has been created but not activated.
- Green – the provider is activated and registered. No errors have occurred.
- Orange – the provider is activated but at least one error has occurred in conjunction with the assigned users.

If an Internet telephony service provider is activated, it moves upwards in the WBM tree above the non-activated Internet telephony service providers. The active Internet telephony service providers are arranged in order of their provider identifiers in the system (1 - 4).

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider (right-click the selected Internet telephony service provider) *Activate Internet Telephony Service Provider*

An error message is issued if you try to activate an Internet telephony service provider when there are already four active. First deactivate an Internet telephony service provider that you no longer need and then activate the Internet telephony service provider you want.

LCR and provider identifiers in the system

The communication platform's LCR is not affected because the higher-ranking sequence number, that is, the provider identifier in the system, remains the same and this is the reference to the LCR.

Example: The connection to LCR is the entry "Provider identifier in the system" 1 to 4In the system, the trunks have been configured with Internet telephony service providers 1 through 4 (Lines/networking... --> IP Trunks) and assigned to LCR. When you activate an Internet telephony service provider, this is queried and displayed as a number before the provider name. If you want a provider to be reached via LCR (Dialed digits --> ... Route = Trk Grp.12) as provider 1, this provider must be assigned the number "1" in HG 1500 as provider identifier in the system.

7.5.4.8 Deactivate Internet Telephony Service Provider

> This menu item is only displayed if the Internet telephony service provider is active.

Only four Internet telephony service providers can be active simultaneously. An inactive Internet telephony service provider is indicated by a gray bullet point or yellow folder.

The color of the bullet point or of the folder indicates the Internet telephony service provider status:

● 🟨
- Gray bullet point or yellow folder – the provider has been created but not activated.

🟢 🟩
- Green – the provider is activated and registered. No errors have occurred.

🟠 🟧
- Orange – the provider is activated but at least one error has occurred in conjunction with the assigned users.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider (right-click the selected Internet telephony service provider) *Deactivate Internet Telephony Service Provider*

7.5.4.9 Delete Internet Telephony Service Provider

You can delete the selected Internet telephony service provider. Only deactivated Internet telephony service providers can be deleted.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > (right-click the selected Internet telephony service provider) *Delete Internet Telephony Service Provider*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.4.10 Add Internet Telephony User

You can add one or more Internet telephony users to the selected Internet telephony service provider.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > (right-click the selected Internet telephony service provider) *Add Internet Telephony User*

The *Internet Telephony User* mask is displayed. The field names may differ depending on the Internet telephony service provider selected. The data required in these fields is supplied by the provider:

- **Internet Telephony User** or **Internet Telephony Phone Number**:
  Name or phone number of the Internet telephony user with which he or she is registered.
- **Authorization Name** or **E-mail Address**:
  Authentication name or e-mail address of the Internet telephony user with which he or she is registered.
- **New Password/Confirm Password**:
  Password for access on call signaling. Re-enter the password for confirmation.

Internet Telephony User (folder):

Double-clicking an *Internet telephony service provider* displays the tree structure with the Internet telephony users already set up for the Internet telephony service provider. Right-click an individual Internet telephony user to display a menu containing the following entries:

> View Internet Telephony User
> Edit Internet Telephony User
> Delete Internet Telephony User

7.5.4.11 View Internet Telephony User

You can view the settings for the Internet telephony user.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User (right-click) *Display Internet Telephony User*

The *Internet Telephony User* mask is displayed.

7.5.4.12 Edit Internet Telephony User

This function makes it easy to change a provider for an Internet telephony user without having to re-enter all information. Ensure that the parameters transferred are also compatible with the new Internet telephony service provider.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User (right-click) *Edit Internet Telephony User*

The *Internet Telephony User* mask is displayed. In addition to the fields described in Section 7.5.4.10, "Add Internet Telephony User", you can also edit the following field:

- **Provider name**:
  The selected Internet telephony user can be assigned to another provider from the selection list. The Internet telephony user is deleted from the list of users for the previous Internet telephony service provider and assigned to the new Internet telephony service provider.

7.5.4.13 Delete Internet Telephony User

You can delete the selected Internet telephony user.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User > (right-click) *Delete Internet Telephony User*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.4.14 Add MSN

You can assign multiple MSNs to the selected Internet telephony user.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User > (right-click MSNs) > *Add MSN*

The "MSN Entry" mask is displayed:

MSN Entry:

- **Internet Telephony Phone Number**:
  SIP phone number of the type ITSP phone number
- **Internal call number** :
  An internal phone number can be assigned to every SIP phone number.
- **Default Entry**:
  If you activate this option, then every user who wants to use SIP for telephony but is not assigned a separate SIP phone number can use this phone number via the Internet telephony service provider.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

Double-clicking an *Internet telephony user* displays the tree structure with the MSN entries already set up for the Internet telephony user. Right-click an individual MSN entry to display a menu containing the following entries:

> View MSN
> Edit MSN
> Delete MSN

The *MSN Entry* mask is displayed after you select View MSN or Edit MSN (see above).

7.5.4.15 View MSN

You can view the settings for the MSN entries.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User > Select MSN > (right-click) *View MSN*

The *MSN Entry* mask is displayed.
For descriptions of the individual fields, see Section 7.5.4.14, "Add MSN".

7.5.4.16 Edit MSN

You can edit the settings for the MSN entries.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User > Select MSN > (right-click) *Edit MSN*

The *MSN Entry* mask is displayed.
For descriptions of the individual fields, see Section 7.5.4.14, "Add MSN".

7.5.4.17 Delete MSN

You can delete the selected MSN entry.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User > Select MSN > (right-click) *Delete MSN*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.4.18 DID Ranges

The DID Ranges item is used for automatic MSN configuration if a PABX number is available.

WBM path: WBM > Explorers > Voice Gateway > Internet Telephony Service Provider > Select Internet Telephony Service Provider > Select Internet Telephony User > DID Ranges

The *DID Ranges* mask is displayed.

- **Country code**:
  International component of the phone number
- **Local area code**:
  National component of the phone number

Internet telephony DID range

- **PABX number**:
  System component of the phone number
- **DID band from - to**:
  DID component of the call no.
- **Start internal call number range**:
  Any station in the system which is to be given the first MSN. The following MSNs are assigned to the following stations in the system.
- **Assign DID band to the stations automatically**:
  The internal call numbers are assigned automatically to the Internet telephone numbers. The first call no. is entered into the field *Start of internal call, number range*.

7.5.5 Destination codec parameters

You can add, change or delete the codecs G.711 A law, G.711 µ law, G.723, G.729A and G.729B for a specific IP address.

Background information:

See Section 9.2, "Bandwidth Requirements in LAN/WAN Environments"

WBM path:

WBM > Explorers > Voice Gateway > *Destination Codec Parameters*

Right-click Destination *Codec Parameters* to display a menu with the following entries:

> Adding Destination Codec Parameters
> Editing destination codec parameters
> Deleting destination codec parameters

7.5.5.1 Adding Destination Codec Parameters

You can add destination codec parameters for a specified IP address.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (right-click) Destination codec parameters > *Add Destination Codec Parameters.*

The Destination *Codec Parameters* mask is displayed. In the "Codec" table you can enter the following parameters for the protocols G.711 A law, G.711 μ law, G.723, G.729A and G.729AB :

- *Priority:* This field contains the priority for using the codec. The priority can be set from 1 (high) to 7 (low). Assign different priorities to the codecs. In the default configuration, G.711 A law has priority 3, G.711 μ law has priority 4, G.723 has priority 5, G.729A has priority 2, and G.729AB has priority 1. G.729B and G.729 have the status "not used“.
- *Voice Activity Detection (VAD)* This field defines whether or not Voice Activity Detection (VAD) should be used for the relevant codec.
- *Frame Size*: You can set the sampling rate in this field. The adjustable values depend on the codecs.

Destination

- *Destination Address Type*: Select the host, subnet or area.
- *IP address*: Enter the associated IP address for the entry

7.5.5.2 Editing destination codec parameters

If you have added a destination codec parameter for a specified IP address, you can also edit it.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (right-click) Destination codec parameters > *Edit Destination Codec Parameters.*

The Destination *Codec Parameters* mask is displayed.

The parameters can be edited in the "Codec“ table . For descriptions of the individual fields, see Section 7.5.5.1, "Adding Destination Codec Parameters".

7.5.5.3 Deleting destination codec parameters

You can delete destination codec parameters for a specified IP address.

WBM path:

WBM (Write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (right-click) Destination codec parameters > *Delete Destination Codec Parameters.*

The *Delete Codec Parameters* mask is displayed for the selected entry.

Button

Use the *Delete* button to confirm that you want to delete the entry, or cancel the operation with the *Cancel* button.

7.5.6 PBX

PBX nodes (HiPath systems) can be identified by a number from 1 to 64. IP addresses can be assigned to the identification number. You can configure and administer PBX nodes, edit the associated IP addresses and codec settings and configure call numbers for these nodes.

WBM path:

WBM > Explorers > Voice Gateway > *PBX*

PBX (folder):

Double-click *PBX* in the tree structure to display the following entries:

> IP Networking Data
> Nodes
> Routing

> The *Routing* entry is only available if the HG 1500 was assigned the "gatekeeper" role in HiPath 3000 Manager E.

7.5.6.1 IP Networking Data

You can adopt settings for PBX node monitoring.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > *IP Networking Data*

Right-click *IP Networking Data* to display a menu containing the following entries:

> Display
> Edit

7.5.6.2 Display

You can view general IP networking data and settings for node monitoring.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > (right-click) IP Networking Data > *Display*

The *IP Networking Data* mask is displayed.
For descriptions of the individual fields, see Section 7.5.6.3, "Edit".

7.5.6.3 Edit

This function allows you to edit settings for the transparent transmission of fax and modem data via a B channel and for PBX node monitoring.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (right-click) IP Networking Data > *Edit*

The *IP Networking Data* mask is displayed. You can edit the following fields:

- *Monitoring Timer (sec)*: In this field, enter the time interval for node monitoring.
- *Alive Monitoring via*: Specify how node monitoring should be performed. The following options are available: *Ping (ICMP)* or *TCP*.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.6.4 Nodes

PBX nodes (HiPath systems) can be identified by a number from 1 to 64. The IP addresses can be assigned to the identification number.

The functions described below can be used to configure and administer PBX nodes, edit the associated IP addresses and codec settings and configure call numbers for these nodes. These configurations are automatically generated in the case of HiPath 5000 RSM. The H.323 parameters are used as a template for the codecs (see Section 7.5.1, "H.323 Parameters").

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > *Nodes*

Right-click *Nodes* to display a menu containing the following entry:

> Add PBX Node

Nodes (folder):

If nodes have already been added (see Section 7.5.6.5, "Add PBX Node"), the *Nodes* entry is displayed as an expandable folder. Double-click *Nodes* to open the folder. A node number is displayed for each entry in the open folder. Right-click a node number to display a menu containing the following entries:

> Display IP Addresses
> Edit IP Addresses
> Display Codecs
> Edit Codecs
> Edit PBX Node
> Delete PBX Node

7.5.6.5 Add PBX Node

You can add the node number of a HiPath system.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (right-click) Nodes > *Add PBX Node*

The *Add PBX Node* mask is displayed. You can edit the following field:

- *Node Number*: Enter the desired number of a PBX node.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Edit PBX Node* mask is displayed.

7.5.6.6 Display IP Addresses

You can view the IP addresses of HG boards in HiPath systems for which you have defined a node number (see Section 7.5.6.5, "Add PBX Node").

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > (double-click) Nodes > (right-click) selected node number > *Display IP Addresses*

The *PBX Node / IP Addresses* mask is displayed. For descriptions of the individual fields, see Section 7.5.6.7, "Edit IP Addresses".

7.5.6.7 Edit IP Addresses

You can edit the IP addresses of HG boards in HiPath systems for which you have defined a node number (see Section 7.5.6.5, "Add PBX Node").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (double-click) Nodes > (right-click) selected node number > *Edit IP Addresses*

The *PBX Node / IP Addresses* mask is displayed. You can edit the following fields:

- *LAN trunking protocol*: Select the required voice transmission protocol from the list box. The following protocols are available:
  - H.323-Q
  - Native H.323
  - SIP-Q
  - Native SIP
- *Using ILS for Address Resolution*: This field activates and deactivates the ILS function (selected field = on). If the function is activated, the boards do not have to be assigned IP addresses manually and Alive Monitoring is always enabled. This is why all other fields in this dialog are deactivated when this function is activated.
- *HXG Boards IP address*: Enter the IP address of the relevant board in this field if ILS address resolution is not used.
- *Alive Monitoring*: This field activates and deactivates Alive Monitoring (selected field = on) if ILS address resolution is not used.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *PBX Node / IP Addresses* mask reappears.

7.5.6.8 Display Codecs

You can view the codec parameters of HG boards in HiPath systems for which you have defined a node number (see Section 7.5.6.5, "Add PBX Node").

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > (double-click) Nodes > (right-click) selected node number > *Display Codecs*

The *Node Codecs* mask is displayed. For descriptions of the individual fields, see Section 7.5.6.9, "Edit Codecs".

7.5.6.9 Edit Codecs

You can edit the codec parameters of HG boards in HiPath systems for which you have defined a node number (see Section 7.5.6.5, "Add PBX Node").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (double-click) Nodes > (right-click) selected node number > *Edit Codecs*

The *Node Codecs* mask reappears. You can edit the following fields:

- *Codec Packetizing:* Enter the number of frames per RTP packet in this field. A higher value means a better user data/packet overhead ratio but also a higher delay. A value between 1 and 3 can be set.
- *Priority for G.711 µ-law Codec*: This field contains the priority with which the codec for G.711 µ-law is available (1-7).
- Priority for G.711 A-law Codec: This field contains the priority with which the codec for G.711 A-law is available (1-7).
- *Priority for G.723 Codec*: This field contains the priority with which the G.723 codec is available (1-7 or "not used").
- *Priority for G.729 Codec*: This field contains the priority with which the G.729 codec is available (1-7 or "not used").
- *Priority for G.729A Codec*: This field contains the priority with which the G.729A codec is available (1-7 or "not used").
- *Priority for G.729B Codec*: This field contains the priority with which the G.729B codec is available (1-7 or "not used").
- *Priority for G.729AB Codec*: This field contains the priority with which the G.729AB codec is available (1-7 or "not used").

> Assign different priorities to the codecs. The priorities 1-7 may only be assigned to one codec each or a codec can be assigned the "not used" priority.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Node Codecs* mask reappears.

7.5.6.10 Edit PBX Node

You can edit the node number of a HiPath system.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (right-click) Nodes > *Edit PBX Node*

A window in which you can select the previous node number is displayed. Confirm your selection with *OK*.

The *PBX Node* mask is displayed. You can edit the following field:

- *Node Number*: Enter the new number you want to set for a PBX node.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Edit PBX Node* mask is displayed.

7.5.6.11 Delete PBX Node

You can delete a node number that you added.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (right-click) Nodes > *Delete PBX Node*

A window in which you can select the previous node number is displayed. Confirm your selection with *OK*.

The *Delete PBX Node* mask is displayed. The node data is displayed for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.6.12 Routing

This element allows you to manage the route numbers for configured PBX nodes (see Section 7.5.6.4, "Nodes").

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > *Routing*

Right-click *Routing* to display a menu containing the following entries:

> Adding a station number
> Delete All Call Addresses
> Call Address Table Editor

Routing (folder):

If station numbers have already been added (see Section 7.5.6.13, "Adding a station number"), the *Routing* entry is displayed as an expandable folder. Double-click *Routing* to open the menu. A station number is displayed for each entry in the open folder. The assigned node number is displayed after the call address in angle brackets. Right-click a station number to display a menu containing the following entries:

> Display Call Address
> Edit Call Address
> Delete Call Address

7.5.6.13 Adding a station number

You can add PBX route call addresses for PBX nodes (see Section 7.5.6.4, "Nodes").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (right-click) Routing > *Add Call Address*

The *Add PBX Route Call Address* mask is displayed. You can edit the following fields:

- *Node Number*: In this field, select the number of the PBX node to which you want to assign a station number.
- *Station Number*: In this field, enter the station number of the PBX node.
- *Service*: Use this selection box to define which service is configured on this node (Voice, Modem, Fax).

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Edit PBX Route Call Address* mask is displayed.

7.5.6.14 Delete All Call Addresses

You can delete all PBX route call addresses configured for PBX nodes at once (see Section 7.5.6.4, "Nodes").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (right-click) Routing > *Delete All Call Addresses*

A warning is displayed. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.6.15 Call Address Table Editor

The Call Address Table Editor allows you to edit all existing and new
PBX route call addresses at once.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > (right-click) Routing > *Call Address Table Editor*

A separate window containing the Table Editor is displayed. Each line in the table represents a route call address. For descriptions of the individual fields, see Section 7.5.6.13, "Adding a station number". For information on how to use the Table Editor, see Section 3.2.5, "Table Editor".

7.5.6.16 Display Call Address

You can view detailed information on an existing PBX route call address.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) PBX > (double-click) Routing > (right-click) selected station number > *Display Call Address*

The *PBX Route Call Address* mask is displayed. For descriptions of the individual fields, see Section 7.5.6.13, "Adding a station number".

7.5.6.17 Edit Call Address

You can edit detailed information on an existing PBX route call address.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (double-click) Routing > (right-click) selected station number > *Edit Call Address*

The *PBX Route Call Address* mask is displayed. For descriptions of the individual fields, see Section 7.5.6.13, "Adding a station number".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *PBX Route Call Address* mask reappears.

7.5.6.18 Delete Call Address

You can delete an existing PBX route call address.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Voice Gateway > (double-click) PBX > (double-click) Routing > (right-click) selected station number > *Delete Call Address*

The *Delete PBX Route Call Address* mask is displayed. The data associated with the PBX route call address is displayed for verification purposes.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.5.7 Clients

This allows you to display the settings for the H.323 and HFA system clients. H.323 and HFA system client settings are made using the HiPath 3000 Manager E. WBM only has one display function.

WBM path:

WBM > Explorers > Voice Gateway > *Clients*

Clients (folder):

Double-click *Clients* in the tree structure to display the following entries:

> System
> H.323
> SIP

7.5.7.1 System

This folder allows you to display HFA system client settings.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) Clients > *System*

If *System* is displayed as a folder icon, double-click the folder to open it and display all configured HFA system clients. Right-click the relevant HFA system client to display a menu containing the following entries:

> Display HFA System Client

7.5.7.2 Display HFA System Client

This folder allows you to display the settings for an individual HFA system client.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) Clients > (double-click) System > (right-click) selected client > *Display HFA System Client*

The *HFA System Client* mask is displayed. It shows the client’s station number in addition to information on authentication (enabled or disabled) and monitoring (enabled or disabled).

7.5.7.3 H.323

This folder allows you to display H.323 client settings.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) Clients > *H.323*

If *H.323* is displayed as a folder icon, double-click the folder to open it and display all configured H.323 clients. Right-click the relevant H.323 client to display a menu containing the following entries:

> Display Client

7.5.7.4 Display Client

This folder allows you to display the settings for an individual H.323 client.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) Clients > (double-click) H.323 > (right-click) selected client > *Display Client*

The *H.323 Client* mask is displayed. The client's DID number and IP address are specified.

7.5.7.5 SIP

This option allows you to view the SIP clients configured in the IP network

WBM path:

WBM > Explorers > Voice Gateway > (double-click) Clients > *SIP*

If *SIP* is displayed as a folder icon, double-click the folder to open it and display all configured SIP clients. Right-click on the desired SIP client to display a menu containing the following entries:

> Display Client

7.5.7.6 Display Client

This allows you to display the settings for an individual SIP client.

WBM path:

WBM > Explorers > Voice Gateway > (double-click) Clients > (double-click) SIP > (right-click) selected client > *Display Client*

The *SIP Client* mask is displayed. You can display the following fields:

- *DID number of Client*: Displays the internal DID of the SIP client.
- *IP Address of Client*: Displays the IP address or host name assigned to the SIP client.
- Client registered: Indicates whether the client is registered. *Authentication Required* must be activated.
- *User ID of Client*: Displays the user name for SIP client access. *Authentication Required* must be activated.
- *Security Zone of Client*: Displays the area (security zone) for confidential authentication to the SIP client. *Authentication Required* must be activated.
- *Use fixed IP address*: For each contact, any number of communication addresses (call numbers or IP addresses) may be used. Indicates that a fixed IP address with call number has been assigned to the SIP client.
- *Authentication Required*: Indicates that the subscriber requires authentication (user name and password) in order to log on to the SIP client.
- *SMG subscribers (only registered in backup mode)*: Indicates that the station is not logged on to HiPath 3000/5000. This subscriber is only available during emergency operation.

Button

Refresh: Click this button to refresh the table.

7.5.8 ISDN classmark

You can display or change the settings for an ISDN classmark

WBM path:

WBM > Explorers > Voice Gateway > (double-click) Clients > *ISDN Classmark*

Right-click on ISDN classmark to display a menu containing the following entries:

> Displaying classmarks
> Changing classmarks

7.5.8.1 Displaying classmarks

You can view the settings for ISDN classmarks.

WBM path:

WBM > Explorers > Voice Gateway > Clients > ISDN classmark (right-click) > *Display Classmarks*

The *ISDN Classmark* dialog is displayed.
For descriptions of the individual fields, see Section 7.5.8.2, "Changing classmarks".

7.5.8.2 Changing classmarks

You can change the settings for classmarks with this option.

WBM path:

WBM (write access activated with the padlock icon in the control area?) > Explorers> Voice Gateway > Clients > ISDN classmark (right-click) > *Change Classmarks*

The *Change Classmarks* dialog is displayed. You can change the following fields:

- External connection: Activate this field to allow external connections. If this field is not highlighted, only internal connections are possible
- (Call) Hold/Transfer: Activate this field to allow the (call) hold and call transfer functions.
- Call forwarding: Activate this field to allow call forwarding.
- Callback Activate this field to allow callback.

7.6 VCAPI

VCAPI is a protocol with which an ISDN interface on a server or network PC can be used by PCs in the network in the same way as a local ISDN interface.

The HG 1500's VCAPI support allows all PCs in the LAN to use the gateway's ISDN ports directly via CAPI. This function cannot be used unless every subscriber is uniquely identifiable in the network via a station number and IP address.

You can add or delete subscribers for VCAPI or edit their attributes. This enables you to define your own default values via the configured default VCAPI subscriber. These values are then automatically applied in the configuration and edit masks.

WBM path:

WBM > Explorers > *VCAPI*

The *VCAPI* tree structure is displayed.

Entries under *VCAPI*:

> VCAPI Subscribers

7.6.1 VCAPI Subscribers

This folder allows you to manage VCAPI subscribers.

WBM path:

WBM > Explorers > VCAPI > *VCAPI Subscribers*

Right-click *VCAPI Subscribers* to display a menu containing the following entries:

> Display All VCAPI Subscribers
> Add VCAPI Subscriber
> VCAPI Table Editor

VCAPI Subscribers (folder):

Double-click *VCAPI Subscribers* to display the *Default Subscriber* entry. A separate entry is displayed for each new VCAPI subscriber added (see Section 7.6.1.2, "Add VCAPI Subscriber").

Default Subscriber

Right-click *Default Subscriber* to display a menu containing the following entries:

> Display VCAPI Default Parameters
> Edit VCAPI Default Parameters
> Reset to Factory Default

User-Specified VCAPI Subscriber

Right-click one of the new VCAPI subscribers you added yourself to display a menu containing the following entries:

> Display VCAPI Subscriber Parameters
> Edit VCAPI Subscriber Parameters
> Delete VCAPI Subscriber

7.6.1.1 Display All VCAPI Subscribers

This allows you to view a list of all VCAPI subscribers configured.

WBM path:

WBM > Explorers > VCAPI > (right-click) VCAPI Subscribers > *Display All VCAPI Subscribers*

The *VCAPI Subscriber* mask is displayed. The subscribers are listed in a table. For descriptions of the individual fields, see Section 7.6.1.2, "Add VCAPI Subscriber".

The table entries can be sorted. An arrow after a column name indicates the sort criterion (e.g. "Station Number"). If you wish to sort the table by another column, click the respective column name.

7.6.1.2 Add VCAPI Subscriber

You can add a new VCAPI subscriber.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > VCAPI > (right-click) VCAPI Subscribers > *Add VCAPI Subscriber*

The *Add VCAPI Subscriber* mask is displayed. You can edit the following fields:

- *Station Number*: Use this selection box to select the new VCAPI subscriber’s station number that was configured in HG 1500. Call numbers are administered with HiPath 3000 Manager E. The following appears in the selection box if no call numbers are configured: "No default value applicable".
- *IP address*: Enter the IP address of the new VCAPI subscriber in this field.
- *Fax Group 3*: Specify whether the subscriber can use the Fax Group 3 service. If this option is enabled, the service is automatically disabled for voice transmission.
- *Voice*: Specify whether the subscriber can use the voice transmission service. If this option is enabled, the service is automatically disabled for Fax Group 3.

- *Digital Data*: Select this checkbox if you want to enable digital data transmission for this subscriber.

> The activation states of the fields "Fax Group 3", "Voice" and "Digital Data" do not define which data can actually be transferred but rather which protocol must be used to set up a connection.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Edit VCAPI Subscriber* mask is displayed.

7.6.1.3 VCAPI Table Editor

The VCAPI Table Editor allows you to edit all existing and new VCAPI subscribers at once.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > VCAPI > (right-click) VCAPI Subscribers > *VCAPI Table Editor*

A separate window containing the Table Editor is displayed. Each line in the table represents a VCAPI subscriber. For descriptions of the individual fields, see Section 7.6.1.2, "Add VCAPI Subscriber". For information on how to use the Table Editor, see Section 3.2.5, "Table Editor".

7.6.1.4 Display VCAPI Default Parameters

You can view the default VCAPI subscriber settings.

WBM path:

WBM > Explorers > VCAPI > (double-click) VCAPI Subscribers > (right-click) Default Subscriber > *Display VCAPI Default Parameters*

The *Default VCAPI Subscriber* mask is displayed. For descriptions of the individual fields, see Section 7.6.1.5, "Edit VCAPI Default Parameters".

7.6.1.5 Edit VCAPI Default Parameters

You can edit the default VCAPI subscriber settings.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > VCAPI > (double-click) VCAPI Subscribers > (right-click) Default Subscriber > *Edit VCAPI Default Parameters*

The *Default VCAPI Subscriber* mask is displayed. You can edit the following fields:

- *Station Number*: You cannot apply a default value.
- *IP address*: Enter the IP address of the default VCAPI subscriber in this field.
- *Fax Group 3*: Specify whether the subscriber can use the Fax Group 3 service. If this option is enabled, the service is automatically disabled for voice transmission.
- *Voice*: Specify whether the subscriber can use the voice transmission service. If this option is enabled, the service is automatically disabled for Fax Group 3.
- *Digital Data*: Select this checkbox if you want to enable digital data transmission for this subscriber.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Default VCAPI Subscriber* mask reappears.

7.6.1.6 Reset to Factory Default

You can reset the default VCAPI subscriber settings to the factory defaults.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > VCAPI > (double-click) VCAPI Subscribers > (right-click) Default Subscriber > *Reset to Factory Default*

The *Reset Default Values* mask is displayed and contains a warning.

Click *Reset to Factory Default* and *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.6.1.7 Display VCAPI Subscriber Parameters

You can view the settings associated with a user-specified VCAPI subscriber (see Section 7.6.1.2, "Add VCAPI Subscriber").

WBM path:

WBM > Explorers > VCAPI > (double-click) VCAPI Subscribers > (right-click) selected subscriber > *Display VCAPI Subscriber Parameters*

The *VCAPI Subscriber* mask is displayed. For descriptions of the individual fields, see Section 7.6.1.5, "Edit VCAPI Default Parameters".

7.6.1.8 Edit VCAPI Subscriber Parameters

You can edit the settings associated with a user-specified VCAPI subscriber (see Section 7.6.1.2, "Add VCAPI Subscriber").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > VCAPI > (double-click) VCAPI Subscribers > (right-click) selected subscriber > *Edit VCAPI Subscriber Parameters*

The *VCAPI Subscriber* mask is displayed. For descriptions of the individual fields, see Section 7.6.1.5, "Edit VCAPI Default Parameters".

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *VCAPI Subscriber* mask is displayed.

7.6.1.9 Delete VCAPI Subscriber

You can even delete user-specified VCAPI subscribers (see Section 7.6.1.2, "Add VCAPI Subscriber").

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > VCAPI > (double-click) VCAPI Subscribers > (right-click) selected subscriber > *Delete VCAPI Subscriber*

The *Delete VCAPI Subscriber* mask is displayed. The subscriber’s station number is displayed for verification.

Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.7 Payload

Payload allows you to display and configure connection types and protocols in the gateway, Media Stream Control (MSC) and gateway expansion modules.

WBM path:

WBM > Explorers > *Payload*

The *Payload* tree structure is displayed.

Entries under *Payload*:

> Devices
> QoS Data Collection
> VoIP Security Data
> Media Stream Control (MSC)
> HW Modules
> Mikey
> Signaling & Payload Encryption (SPE)

Right-click Payload to display a menu containing the entry *Refresh Explorer*. The tree structure displayed is updated when you select this entry.

7.7.1 Devices

"Devices" is a collective name for subscribers, features and functions that require channels.

WBM path:

WBM > Explorers > Payload > *Devices*

Right-click on *Devices* to display a menu containing the following entries:

> Display Global Device Settings
> Reset Devices to Factory Settings

Devices (folder):

Double-click the *Devices* folder to display the individual devices. Icons may be displayed in the following colors:

Icon	Meaning
🟢	Green dot: The device can be used (up).
🔴	Red dot: The device cannot be used (down).
●	Gray dot: The device is in an undefined status or is being tested.

Table 7-3 Icon Color and *Device Status*

> Each device in the tree structure is assigned the maximum number of B channels available for this device.

Right-click one of the device entries to display a menu containing the following entries:

> Display Device Settings
> Edit Device Settings

7.7.1.1 Display Global Device Settings

You can display the settings that apply to all devices:

WBM > Explorers > Payload > (right-click) Devices > *Display Global Device Settings*

The *Global Device Settings* mask is displayed. This shows the codec type of the global gateway, the maximum number of available and licensed B channels and the maximum number of LAN clients per music-on-hold channel (calls received when all lines are busy are not through-connected).

7.7.1.2 Reset Devices to Factory Settings

You can reset the original settings globally for all device settings.

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Payload > (right-click) Devices > *Reset Devices to Factory Settings*

The *Reset Device Settings to Factory Settings* mask is displayed and contains a warning.

Click *Reset to Factory Default* and *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.7.1.3 Display Device Settings

You can display the settings for a device.

WBM path:

WBM > Explorers > Payload > (double-click) Devices > (right-click) selected device > *Display Device Settings*

The *Device Settings* mask is displayed. The name of the device (device type), the current operating mode, the maximum number of B channels available for this device and, if applicable, the communication protocol assigned are displayed for information purposes.

7.7.1.4 Edit Device Settings

You can edit the settings for a number of devices (currently only for the *PPP* device). For all other devices, you can call up the function but none of the fields can be edited.

WBM path:

WBM > Explorers > Payload > (double-click) Devices > (right-click) selected device > *Edit Device Settings*

The *Device Settings* mask is displayed. The name of the device (device type), the current operating mode, the number of B channels available for this device and, if applicable, the communication protocol assigned are displayed for information purposes.

You can edit the following fields for the *PPP* device:

- *Min. No. of Channels Reserved for Device*: In this field, specify the minimum number of channels that must be available.
- *Max. No. of Useable Channels*: In this field, specify the maximum number of channels that can be used. To set the maximum number of useable channels, select *Unlimited*.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Device Settings* mask reappears.

7.7.2 QoS Data Collection

Quality of Service Data Collection (QDC) – tasks and functions:

The HiPath IP service "QoS Data Collection" is a tool which collects data on HiPath products. This data is used to analyze the voice and network quality of the products.

With its range of features, the QoS Data Collection service aims to:

- reduce general expenses for QoS problem analysis
- increase the remote clearance rate
- detect network malfunctions in good time in order to prevent voice quality problems

This results in:

- reduced service outlay
- competitive maintenance contracts
- quick and qualified responses to customer problems
- increased general customer satisfaction with products and technologies
- the possibility to identify changes in the customer network environment and to align the marketing activities of HiPath services accordingly

By using QDC, key improvements can be achieved in the entire service (break/fix) process.

Background information:

See Section 9.3, "Quality of Service (QoS)"

WBM path:

WBM > Explorers > Payload > *QoS Data Collection*

Right-click *QoS Data Collection* to display a menu containing the following entries:

> Display Parameters
> Changing parameters

7.7.2.1 Display Parameters

This option allows you to view the current settings for QoS Data Collection.

WBM path:

WBM > Explorers > Payload > (right-click) QoS Data Collection > *Display Parameters*

The *Quality of Service Data Collection*mask is displayed. For descriptions of the individual fields, see Section 7.7.2.2, "Changing parameters".

7.7.2.2 Changing parameters

This option allows you to edit the current settings for QoS Data Collection.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Payload > (right-click) QoS Data Collection > *Edit Parameters*

The *Quality of Service Data Collection*mask is displayed. You can edit the following fields:

QDC configuration

- *Send to QCU*: Enable this checkbox if you want to send data to the QCU.
  Default value: Checkbox disabled.
- *QCU IP Address*: Enter the IP address or the name of the QCU host here.
  Default value: 0.0.0.0.
- *QCU Receive Port*: Receive port for QCU. Enter the port number for the QCU host here.
  Default value: 12010.
- *Send to Network Management enabled*: Enable this checkbox if you want to send data to the Network Management system.
  Default value: Checkbox disabled.

> If either of the check boxes **Send to QCU** or **Send to Network Management** is enabled (checked), QoS reports will be generated.

QDC report mode

- *Send Report if*: Select the send time for the report from the list box. The following options are available:
  - *do not send*: No reports are sent.
  - *End of session and threshold exceeded*: A report will only be sent at the end of a session and only if the threshold is exceeded.
  - *End of report interval and threshold exceeded*: A report will be sent for each report interval once the threshold has been exceeded.
- *Report Interval (sec)*: Enter the interval (in sec.) at which the reports should be sent. A QoS report will be sent for each report interval if the report mode is set correspondingly.
  Default value: 60 sec.
  Valid values: 0 ... 65535
- *Observation Period (sec)*: This parameter cannot be adjusted.
  Default value: 10 sec.

- *Minimum Session Length (* 100 msec)*: Enter the minimum session length (* 100 msec) here. A QoS report will not be sent if a session (for example, a call) is shorter than the set minimum value.
  Default value: 20 (2 sec)
  Valid values: 0 ... 255

> The time scale is segmented during the observation period and the report interval. Each observation period is checked to monitor if the threshold has been exceeded. A QoS report will be sent for each report interval if the corresponding report mode setting is enabled.

QDC threshold values

- *Upper Jitter Threshold (msec)*: In this field, enter the upper threshold value for report generation. The jitter is checked to monitor if this threshold has been exceeded and is measured in the time between two consecutive RTP packets.
  Default value: 20 msec
  Valid values: 0 ... 255
- *Average Round Trip Delay Threshold (msec)*: Round trip delay reflects the total runtimes in both directions. In this field, enter a threshold value for the average round trip delay that results in report generation.
  Default value: 100msec
  Valid values: 0 ... 65535
- *Thresholds for Compression Codec*: In this field, enter the required number of packets for the compression codec thresholds. The following options are available:
  - *lost packets (per 1000 packets)*: In this field, enter a threshold value for the packets lost during voice decoding. This value represents the packet loss in relation to the total number of packets.
    Default value: 10
    Valid values: 0 ... 255
  - *consecutive lost packets*: In this field, enter a threshold value for consecutive lost packets. The number of consecutive packets lost (uninterrupted by "good" packets) is counted. If the value counted is greater than the value specified, the threshold has been exceeded.
    Default value: 2
    Valid values: 0 ... 255
  - *consecutive good packets*: In this field, enter a threshold value for consecutive good packets. The number of consecutive "good" packets (uninterrupted by lost packets) is counted. If the value counted is less than the value specified, the threshold has been exceeded.
    Default value: 8
    Valid values: 0 ... 255

- *Thresholds for Non-Compression Codec*: In this field, enter the required number of packets for the non-compression codec thresholds. The following options are available:
  - *lost packets (per 1000 packets)*: For a description see *Thresholds for Compression Codec*.
  - *consecutive lost packets*: For a description see *Thresholds for Compression Codec*.
  - *consecutive good packets*: For a description see *Thresholds for Compression Codec*.

Description and application of compression and non-compression codecs

Codec	**Audio Mode**	**Application**
High quality preferred	Uncompressed voice transmission.	Use uncompressed voice transmission. Suitable for broadband intranet connections.
Low bandwidth preferred	Use compressed voice transmission (preferred).	Suitable for connections with different bandwidths.
Low bandwidth only	Use compressed voice transmission only.	Suitable for connections with low bandwidth.

Table 7-4 Codec - Types

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *Quality of Service Data Collection* mask is displayed.

7.7.3 VoIP Security Data

You can view but not edit the settings for voice transmission via the IP network. The settings are made by DLS (Deployment Service). For further information refer to the DLS manual.

WBM path:

WBM > Explorers > Payload > VoIP Security Data

Right-click on *VoIP Security Data* to view the following menu:

> Display Data

7.7.3.1 Display Data

This option allows you to display the settings for VoIP Security Data parameters.

WBM path:

WBM > Explorers > Payload> VoIP Security Data > (right-click) *Display Data*

The *VoIP Security Data* is displayed.

- *Current UTC time on the card*: Universal Time Coordinated
- *Encryption license*: On/Off, according to whether encryption may or may not be used.

7.7.4 Media Stream Control (MSC)

The Media Stream Control (MSC) monitors and administers the media streams that are routed via HG 1500. The MSC is used to transmit media data between LAN and ISDN.

Background information:

See Section 9.1, "Environmental Requirements for VoIP"
See Section 9.2, "Bandwidth Requirements in LAN/WAN Environments"

WBM path:

WBM > Explorers > Payload > *Media Stream Control (MSC)*

Right-click *Media Stream Control (MSC)* to display a menu containing the following entries.

> Displaying MSC settings
> Editing MSC settings
> Reset MSC to Factory Settings

7.7.4.1 Displaying MSC settings

You can view the current settings for media stream control (MSC).

WBM path:

WBM > Explorers > Payload > (right-click) Media Stream Control (MSC) > *Display MSC Settings*

The *MSC Settings* mask is displayed. For descriptions of the individual fields, see Section 7.7.4.2, "Editing MSC settings".

7.7.4.2 Editing MSC settings

You can edit the current settings for media stream control (MSC).

> Media stream control should only be reconfigured by specialists. The parameters available have a complex effect on the transmission quality; a description of these parameters would exceed the scope of this manual.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Payload > (right-click) Media Stream Control (MSC) > *Edit MSC Settings*

The *Edit MSC Settings* mask is displayed. You can edit the following fields:

- *Traffic Statistics (SNMP Only)*: This field allows you to activate or deactivate "Per Call Statistics". If the statistics function is deactivated, "Per-Call Statistics" data associated with the gateway cannot be accessed via SNMP.
- *RTCP Packet Generation Interval (sec)*: Enter the number of seconds after which RTCP packets are generated in this field.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *MSC Settings* mask reappears.

7.7.4.3 Reset MSC to Factory Settings

You can reset the original settings globally for all MSC settings.

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Payload > (right-click) Media Stream Control (MSC) > *Reset MSC to Factory Settings*

The *Reset MSC Settings to Factory Settings* mask is displayed and contains a warning.

Click *Reset to Factory Default* and *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.7.5 HW Modules

HG 1500 comes with DSP modules (DSP - Digital Signal Processor) that support voice, modem and fax functions. If the maximum number of modules is installed, this function is available for up to 60 voice channels simultaneously. The V.90 modem is also supported including PPP (HG 1500 as server) but not for IP networking.

You can manage the DSP module settings.

WBM path:

WBM > Explorers > Payload > *HW Modules*

Right-click *HW Modules* to display a menu containing the following entries:

> Display DSP Settings
> Displaying DSP jitter settings
> Display All HW Modules
> Editing DSP settings
> Editing DSP jitter settings

HW Modules (folder):

Double-click *HW Modules* to display the available modules. Right-click a module entry to display a menu containing the following entry:

> Display HW Module

7.7.5.1 Display DSP Settings

You can view the current settings for the DSP modules.

WBM path:

WBM > Explorers > Payload > (right-click) HW Modules > *Display DSP Settings*

The *DSP Settings* mask is displayed. For descriptions of the individual fields, see Section 7.7.5.4, "Editing DSP settings".

7.7.5.2 Displaying DSP jitter settings

You can review the current jitter settings.

For details/background information, see Section 9.5, "Static and Adaptive Jitter Buffer".

WBM path:

WBM > Explorers > Payload > (right-click) HW Modules > *Display DSP Jitter Settings*

The *DSP Jitter Buffer Settings* mask is displayed. For descriptions of the individual fields, see Section 7.7.5.5, "Editing DSP jitter settings".

7.7.5.3 Display All HW Modules

You can display a list of all HW modules available.

WBM path:

WBM > Explorers > Payload > (right-click) HW Modules > *Display All HW Modules*

The *HW Modules* mask is displayed. This shows the internal index number, the module type (current only PDM), and a short description of the module for every HW module available.

7.7.5.4 Editing DSP settings

You can edit the current settings for the DSP modules.

Background information:

See Section 9.5, "Static and Adaptive Jitter Buffer"

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Payload > (right-click) HW Modules > *Edit DSP Settings*

The *DSP Settings* mask is displayed. You can edit the following fields:

General:

- *Echo Canceller*: EC (Echo Cancellation) suppresses the echo effect in voice transmissions. The function is based on G.168. If you do not want to offer this function, deactivate this option. Normally, EC should always be enabled.
- *DTMF Outband Signaling*: If this option is enabled, DTMF signals are transferred in a separate signaling channel (outband). If it is disabled, the DTMF signals are transferred in the normal voice channel.

Fax Parameter:

- *Error Correction Mode*: If this option is activated, errors are corrected during transmission (ECM mode in the T.30 protocol). The fax machines used must also support this mode.
- *Number of Redundancy Packets*: Select the number of redundant packets set to UDP for the error correction mode (t38UDPRedundancy). The larger the value, the greater the protection for fax transmissions against packet losses on the network. Please note, however, that larger values also increase the bandwidth requirements.

- *Maximum Network Jitter (hex msec)*: If the maximum network jitter for G.711 transmission is known, enter it in this field. If the jitter is not known, the value `FFFF` should be entered here. Any appropriate hexadecimal specification consisting of the digits 0-9 and A-F is permitted. If at all possible these parameters should not be modifed.
- *Fax/Modem Tone Detection Timeout (s)*: Time to detect fax tones during a connection. This ensures a switchover to the T.38 fax protocol. Once the defined time has expired, fax tones are no longer detected. The 0 value means that detection is activated for the entire duration of the connection.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *DSP Settings* mask reappears.

7.7.5.5 Editing DSP jitter settings

You can edit the current jitter settings.

For details/background information, see Section 9.5, "Static and Adaptive Jitter Buffer".

WBM path:

WBM (write access activated with the Padlock icon in the control area?) > Explorers > Payload > (right-click) HW Modules > *Edit DSP Jitter Settings*

The *DSP Jitter Buffer Settings* mask is displayed. You can edit the following fields:

- *Jitter Buffer Type*: Select whether the jitter buffer should be static or adaptive. In adaptive mode, the jitter buffer aligns with the average delay when receiving data. It attempts to keep the delay as low as possible while keeping data packet loss to a minimum. In static mode, the average delay always remains the same.
- *Average Delay for Voice (msec)*: Enter the average number of milliseconds an IP packet should be held in the jitter buffer in the case of IP-based voice transmission. In the case of the *adaptive* jitter buffer type, the value entered here is only a start value. The recommended value for most environments is 40.
- *Maximum Delay for Voice (msec)*: In the case of the *static* jitter buffer type, enter the maximum number of milliseconds permitted for a delay before the jitter buffer intervenes in the data stream when receiving IP packets as part of a voice transmission. For the *adaptive* jitter buffer type, enter the maximum number of milliseconds for the average delay for voice. Outgoing packets are lost if the actual delay measured is higher. The recommended value for the static jitter buffer is 80 for most environments; the recommended value is 120 for the adaptive jitter buffer. This value always be higher than the value in the *Average Delay for Voice (msec)* field.
- *Min. Delay for Voice (msec)*: If *adaptive* was selected as the jitter buffer type, enter the minimum number of milliseconds permitted for the average delay for voice minimal. The average delay is always greater than or equal to this value.

- *Packet Loss / Delay Preference*: If adaptive jitter buffer is set, enter a value between 0 and 8 in this field, indicating your preference for large packet losses over long delays in the case of large packet delays. 0 indicates a preference for minimum packet loss and acceptance of delays in the voice data stream, 8 indicates a preference for a minimum delay in the voice data stream and acceptance of packet losses. The recommended value for most environments is 4. The value entered here influences the total delay for voice connections.
- *Average Delay for Data (msec)*: Enter the average number of milliseconds an IP packet should be held in the jitter buffer for data transmissions. The recommended value for most environments is 60.
- *Maximum Delay for Data (msec)*: Enter the maximum number of milliseconds permitted for a delay before the jitter buffer intervenes when receiving IP packets as part of a data transmission. The recommended value for most environments is 200. Parameter settings are no longer effective if higher values are set (starting from approximately 2000) because a packet leaves the buffer as soon as it is fully received. Although values under 100 msec are possible, they are not recommended in practice.

> Values deviating from the recommendations should only be entered in justifiable situations.
> This dialog is intended for specially trained service technicians.

Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The *DSP Jitter Buffer Settings* mask reappears.

7.7.5.6 Display HW Module

You can display information on the individual HW modules.

WBM path:

WBM > Explorers > Payload > (double-click) HW Modules > (right-click) selected module > *Display HW Module*

The *HW Module* mask is displayed. This shows the HW index, an internal identification number, the HW type (at present only PDM modules are possible – PMC DSP module for B channel expansion), and, where applicable, a brief description of the module.

7.7.6 Signaling & Payload Encryption (SPE)

The Signaling & Payload Encryption (SPE) feature is provided on HiPath 3000/5000 from V7 R4 or later. VoIP payload and signaling data flows from and to the gateway and between IP telephones are encrypted. The basis for this feature is an asymmetrical encryption method. Public and private keys are used with such methods.

It must be ensured that the individual VoIP clients as well as the gateways uniquely identify themselves in the HiPath system. This is achieved using certificates which contain private and public keys. The certificates are generated either by a customer PKI certification authority (RA/CA), by the internal certification authority of the DLS server (CA) or using the LW-CA of the HG 1500. The DLS server then sends the files containing the certificates to the DLS client of the gateway.

Depending on the customer's requirements, security settings can be activated or deactivated for certificate evaluation and data stream encryption. This increases or decreases the encryption security.

WBM path:

WBM > Explorers > Payload > *Signaling and Payload Encryption (SPE)*

Signaling and Payload Encryption (SPE) is displayed as an expandable folder. Double-clicking *Signaling and Payload Encryption (SPE)* displays the following entries in the tree structure:

> SPE Certificate
> SPE CA Certificate(s)

Context menu:

Right-click *Signaling and Payload Encryption (SPE)* to display a menu containing the following entries.

> View Security Settings
> Edit Security Configuration

Background information:

See Section 9.6.2, "Certificates"

7.7.6.1 SPE Certificate

This folder contains the SPE certificate with the private key. By default this folder is empty. The certificate must firstly be imported. If necessary you can view the imported certificate and then delete it. The file which contains the certificate must be in PEM or PKCS#12 format. The files originates from a customer PKI certification authority (RA/CA), from the internal certification authority (CA) of the DLS server or from the LW-CA of the HG 1500.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > *SPE Certificate*

Context menu for the *SPE Certificate* folder:

Right-click the *SPE Certificate* folder to display the following menu entry:

> Import SPE certificate plus private key (PEM or PKCS#12)

Context menu for the SPE certificate:

Right-click the SPE certificate to display a menu containing the following entries:

> View SPE Certificate
> Delete SPE Certificate

Import SPE certificate plus private key (PEM or PKCS#12)

A PKCS#12 file contains the data for a certificate and the associated private key. You can import the relevant PKCS#12 file to use this certificate.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > (right-click) SPE Certificate > *Import SPE certificate plus private key (PEM or PKCS#12)*

Procedure:

Proceed as follows to import the SPE certificate:

1. Select: WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > (right- click) SPE Certificate > *Import SPE certificate plus private key (PEM or PKCS#12).* The *Load a SPE Key Certificate via HTTP* mask is displayed. You can edit the following fields:
   - *Passphrase for decryption*: In this field, enter the password which was used for creating the PKCS#12 file.

- *File with certificate and private key (PEM or PKCS#12 format)*: Specify the path and name of the file which contains the certificate data to be imported. Click *Browse...* to open a dialog to search for the file.

2. Click *Load*.

View SPE Certificate

You can display an SPE certificate, for example, if you want to check it.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE Certificate > (right-click) SPE Certificate > *View SPE Certificate*

Procedure:

1. Select: WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE Certificate > (right-click) SPE Certificate > *View SPE Certificate*. The *Certificate Information* mask is displayed.
   This displays general certificate data (such as the name, type, and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format.
2. No further steps.

Delete SPE Certificate

You can delete the SPE certificate. If is only possible to delete it when SPE is not active. A new certificate can be simply loaded over an existing certificate. It is not necessary to delete it beforehand.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE Certificate > (right-click) SPE Certificate > *Delete SPE Certificate*

Procedure:

1. Select: WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE Certificate > (right-click) SPE Certificate > *Delete SPE Certificate*. A warning appears. The name of the certificate is also specified for verification purposes.
2. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.7.6.2 SPE CA Certificate(s)

This folder contains trusted SPE CA certificates. You can import new trusted SPE CA certificates and display or delete existing ones.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > *SPE CA Certificate(s)*

Context menu for the *SPE CA Certificate(s)* folder:

Right-click the *SPE CA Certificate(s)* folder to display the following menu entry:

> Import trusted CA Certificate (X.509 file) for SPE

Context menu for an SPE CA certificate:

Right-click an SPE CA certificate to display a menu containing the following entries:

> Display SPE CA Certificate
> Display CDP and CRL
> Delete SPE CA Certificate

Import trusted CA Certificate (X.509 file) for SPE

Up to 16 trusted CA certificates can be imported individually from a customer PKI certification authority (RA/CA), from an internal certification authority (CA) of the DLS server or from the LW-CA of the HG 1500. The SPE certificate with the private key is an exception here.

The certificate to be imported must be valid.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > (right-click) SPE CA Certificate(s) > *Import trusted CA Certificate (X.509 file) for SPE*

Procedure:

Follow these steps to import a trusted CA certificate:

1. Select: WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > (right-click) SPE CA Certificate(s) > *Import trusted CA Certificate (X.509 file) for SPE (PEM or binary file).* The *Load a SPE CA Certificate via HTTP* dialog box opens. You can edit the following fields:
   - *File with certificate (PEM or binary file)*: Enter the path and the file name of the PEM or binary file to import. Click *Browse...* to open a dialog to search for the file.
   - *CRL Distribution Point (CDP) (HTTP or LDAP URI)*: Specify the CDP.
     A CDP is an optional certificate extension. A certificate received is only checked against the CRLs for which the CDP was configured.
2. Click *View Fingerprint of Certificate*.
3. Following successful decoding of the certificate, click *Import certificate from file*.

Display SPE CA Certificate

You can display an SPE CA certificate, for example, if you want to check it.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE CA Certificate(s) > (right-click) SPE CA Certificate(s) > *Display SPE CA Certificate*

Procedure:

1. Select: WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE CA Certificate(s) > (right-click) SPE CA Certificate(s) > *View Certificate*. The *Certificate Information* mask is displayed.
   This displays general certificate data (such as the name, type, and serial number), information on the issuer and the subject name as well as encryption data. The public key used and the fingerprint are displayed in hexadecimal format.
2. No further steps.

Display CDP and CRL

The IP addresses for the CRL and CDP are displayed after you select this menu item (CRL: Certificate Revocation List; CDP: CRL-Distribution Point). CDP:

If the (CRL) should be loaded in a separate step, a message appears telling you that there is no CRL saved for the certificate.

The CDP can only be loaded using the DLS and cannot be done separately. If a CDP is configured but no CRL is displayed, then either the option *Certificate validation with CRL verification required* is deactivated or a valid CRL could not by loaded from the CDP.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE CA Certificate(s) > (right-click) SPE CA Certificate(s) > *Display CDP and CRL*

Procedure:

1. WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE CA Certificate(s) > (right-click) SPE CA Certificate(s) > *Display CDP and CRL*. The *Certificate Revocation List Information* mask is displayed.
2. No further steps.

Delete SPE CA Certificate

You can delete an imported SPE CA certificate, for example, if you need a new one.

WBM path:

WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE CA Certificate(s) > (right-click) SPE CA Certificate(s) > *Delete Certificate*

Procedure:

1. WBM > Explorers > Payload > (double-click) Signaling & Payload Encryption (SPE) > SPE CA Certificate(s) > (right-click) SPE CA Certificate(s) > *Delete Certificate*. The *Delete CA Certificate for SPE* mask is displayed.
2. Click *Delete* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area).

7.7.6.3 View Security Settings

The *SPE Security Setup* dialog box displays the security settings for signaling and payload encryption (SPE), i.e. for the encryption of signaling and payload communication between the gateway and the VoIP clients as well between two gateways.

WBM path:

WBM > Explorers > Payload > (right-click) Signaling & Payload Encryption (SPE) > *Show Security Configuration*

Procedure:

Proceed as follows to display the SPE security configuration:

1. Select: WBM > Explorers > Payload > (right-click) Signaling & Payload Encryption (SPE) > *Show Security Configuration*. The *SPE Security Setup* mask is displayed containing the following data:

   - *Minimal length of the RSA key*: e.g. 1024.
     Minimal length of the RSA key in the certificates. The following lengths are possible: 512, 1024 and 2048. The higher the value, the more secure the key.

   - *Certificate validation with CRL verification required*: for example, No.
     You can use the certificate revocation list (CRL) to specify whether and why a certificate should be blocked/revoked. If a certificate or certification authority (CA) declares a certificate invalid, it enters the certificate's serial number in its list. This list can be downloaded from the certification authority's Internet site for certificate inspection.

   - *Minimum Re-Keying interval [hours]*: for example. 24.
     This interval defines how long a certain key should be used for the encryption of signaling and user data. A new key is generated when this interval expires.

   - *Subjectname check*: e.g. No.
     By checking the subject name in the certificate of a gateway (HG 1500) its identity can be checked. The subject name contains the IP address or the DNS name (DNS: Domain Name System) of the respective gateway.

   - *Salt Key Usage*: e.g. Yes.
     This procedure can be used to securely encrypt passwords. This procedures makes decrypting these passwords considerably more difficult or even almost impossible. For example after encryption it is not possible to tell whether two users have the same password.

- *SRTP authentication required* (SRTP: Secure Realtime Transport Protocol): for example, Yes.
  You can use SRTP authentication to check:

  – if the user data message from a VoIP client is authentic.

  – if a user data message was already received once.

  This helps avoid user data falsification and replay attacks.

- *SRTCP encryption required* (SRTCP: Secure Real-time Transport Control Protocol): for example, Yes.
  You can use SRTCP authentication to check:

  – if the signaling data message from a VoIP client is authentic.

  – if a signaling data message was already received once.

  This helps avoid signaling data falsification and replay attacks.

- SRTP/SRTCP authentication tag length: 80
  The authentication tag is appended to a data packet to guarantee its authenticity. The length of the tag cannot be changed.

2. No further steps. However, you can modify the SPE security configuration, see Edit Security Configuration.

7.7.6.4 Edit Security Configuration

The *Edit SPE Security Setup* mask lets you customize the security settings for signaling and payload encryption (SPE) to satisfy the customer's security requirements. This affects the encryption of signaling and user data in communications between the gateway and VoIP clients as well as between two gateways.

WBM path:

WBM > Explorers > Payload > (right-click) Signaling & Payload Encryption (SPE) > *Edit Security Configuration*

Procedure:

Proceed as follows to edit the SPE security configuration:

1. Select: WBM > Explorers > Payload > (right-click) Signaling & Payload Encryption (SPE) > *Edit Security Configuration*. The *Edit SPE Security Setup* mask is displayed. You can edit the following data in this mask:
   - *Minimal length of RSA keys*: Select the minimum length of the RSA key for the certificates. The following lengths are possible: 512, 1024 and 2048. The higher the value, the more secure the key.
   - *Certificate validation with CRL verification required*: Select this checkbox if you want to use a certification revocation list to check if a certificate is invalid.
     You can use the certificate revocation list (CRL) to specify whether and why a certificate should be blocked/revoked. If a certificate or certification authority (CA) declares a certificate invalid, it enters the certificate's serial number in its list. You can download this list for certification inspection. You need an Internet connection to the certification authority for this.
   - *Minimum Re-Keying interval [hours]*: Enter how long a specific key should be used for the encryption of signaling and user data. A new key is generated when this interval expires.
   - *Subjectname check*: Activate this checkbox if you want to check the subject name in the certificate of a VoIP client.
     By checking the subject name in the certificate of a gateway (HG 1500) its identity can be checked. The subject name contains the IP address or the DNS name (DNS: Domain Name System) of the respective gateway.
   - *Salt Key Usage*: Select this checkbox if you want to perform high encryption for passwords.
     You can use this procedure to perform high encryption for passwords. This procedure makes the decryption of these passwords much more difficult or even impossible. Following encryption, it is therefore impossible to tell if two users are using the same password.

- *SRTP authentication required* (SRTP: Secure Realtime Transport Protocol): Select this checkbox if you want to ensure user data authenticity and avoid replay attacks.
  You can use SRTP authentication to check:
  - if the user data message from a VoIP client is authentic.
  - if a user data message was already received once.
- *SRTCP encryption required* (SRTCP: Secure Real-time Transport Control Protocol): Select this checkbox if you want to ensure signaling data authenticity and avoid replay attacks.
  You can use SRTCP authentication to check:
  - if the signaling data message from a VoIP client is authentic.
  - if a signaling data message was already received once.

2. Click *Apply* followed by *OK* in the confirmation mask (save the new configuration status permanently with the Save icon in the control area). The changed data is incorporated into the configuration.

7.7.7 Mikey

The Multimedia Internet Keying Protocol (Mikey) is a protocol for exchanging keys. The Signaling & Payload Encryption (SPE) feature only uses Mikey for the encryption of user data and authentication, not for the encryption of signaling data. The main purpose of Mikey is to generate and distribute the keys needed for the encryption and authentication of SRTP user data. Keys are exchanged with every new call.

WBM path:

WBM > Explorers > Payload > *Mikey*

The *Mikey* tree structure is displayed.

Entries under *Mikey*:

> Mikey Policies
> SRTP Security Policy
> Mikey Statistics

7.7.7.1 Mikey Policies

WBM path:

WBM > Explorers > Payload > Mikey > *Mikey Policies*

A table appears:

- Mikey Policies
- Key Agreement Method
- Encryption Algorithm
- MAC Algorithm

7.7.7.2 SRTP Security Policy

WBM path:

WBM > Explorers > Payload > Mikey > *SRTP Security Policy*

The *SRTP Security Policy* mask is displayed:

- Authentication Algorithm
- Authentication Key Length
- Salting Key Length

- Authentication Tag Length
- Encryption Algorithm
- Encryption Key Length
- Key Derivation Rate
- Key Derivation Function
- SRTP Encryption active
- SRTP Authentication active
- SRTP Prefix Length
- SRTP Encryption active

7.7.7.3 Mikey Statistics

WBM path:

WBM > Explorers > Payload > Mikey > *Mikey Statistics*

The *Mikey Statistics* mask is displayed.

- Total number of key exchanges
- Successfully finished key exchanges
- Failed key exchanges
- Currently active key exchanges
- Maximum simultaneous key exchanges
- Key exchanges in Initiator Role
- Key exchanges in Responder Role
- Key exchanges in DMC Proxy Role

7.8 Statistics

Statistics can be used to monitor the gateway performance and status.

WBM path:

WBM > Explorers > *Statistics*

The *Statistics* tree structure is displayed.

Entries under *Statistics*:

> Device Statistics
> MSC Statistics
> Call Statistics
> SNMP Statistics

7.8.1 Device Statistics

This folder contains statistics on LAN usage and SCN.

WBM path:

WBM > Explorers > Statistics > *Device Statistics*

Double-click *Device Statistics* to display the following entries:

> LAN Statistics
> SCN Statistics

7.8.1.1 LAN Statistics

The LAN statistics provide information on the channels configured and used by individual LAN devices.

WBM path:

WBM > Explorers > (double-click) Device Statistics > *LAN Statistics*

Right-click *LAN Statistics* to display a menu containing the following entry:

> Display LAN Statistics

7.8.1.2 Display LAN Statistics

You can view the current LAN statistics.

WBM path:

WBM > Explorers > (double-click) Device Statistics > (right-click) LAN Statistics > *Display LAN Statistics*

The *Resource Statistics for Devices on LAN Side* mask is displayed. It contains a table that displays the resources currently used by each device type. Please note the advisory under the table indicating that the front panel (see Chapter 4, "Front panel") also provides information on resource assignment by devices.

7.8.1.3 SCN Statistics

The SCN statistics provide information on the channels configured and used by individual SCN devices.

WBM path:

WBM > Explorers > (double-click) Device Statistics > *SCN Statistics*

Right-click *SCN Statistics* to display a menu containing the following entry:

> Display SCN Statistics

7.8.1.4 Display SCN Statistics

You can view the current LAN statistics.

WBM path:

WBM > Explorers > (double-click) Device Statistics > (right-click) SCN Statistics > *Display SCN Statistics*

The *SCN Device Statistics* mask is displayed. It contains a table that specifies the number of resources currently seized for each device type as well as the percentage of licensed channels. It also shows how many channels are licensed. Please note the advisory under the table indicating that the front panel (see Chapter 4, "Front panel") also provides information on resource assignment by devices.

7.8.2 MSC Statistics

This folder contains statistics on Media Stream Control – MSC.

WBM path:

WBM > Explorers > Statistics > *MSC Statistics*

Double-click *MSC Statistics* to display the following entries:

> Overall Statistics
> Per-Call Statistics

7.8.2.1 Overall Statistics

The MSC overall statistics offer an overview of the statistical data for all registered calls.

WBM path:

WBM > Explorers > (double-click) MSC Statistics > *Overall Statistics*

Right-click *Overall Statistics* to display a menu containing the following entry:

> Display Overall Statistics

7.8.2.2 Display Overall Statistics

You can open the current MSC overall statistics.

WBM path:

WBM > Explorers > (double-click) MSC Statistics > (right-click) Overall Statistics > *Display Overall Statistics*

The *MSC Overall Statistics* mask is displayed. It provides information on RTP/TCP packets sent and not sent, packets received and not received and the number of bytes sent and received.

7.8.2.3 Per-Call Statistics

The MSC per-call statistics provides a table listing connection data for every registered call.

WBM path:

WBM > Explorers > (double-click) MSC Statistics > *Per-Call Statistics*

Right-click *Per-Call Statistics* to display a menu containing the following entry:

> Display Per-Call Statistics

7.8.2.4 Display Per-Call Statistics

You can display the current MSC statistics with connection data for individual calls.

WBM path:

WBM > Explorers > (double-click) MSC Statistics > (right-click) Per-Call Statistics > *Display Per-Call Statistics*

The *MSC Per-Call Statistics* mask is displayed. The table displayed lists the relevant IP addresses, the connection setup time, codec information, the number of bytes and packets sent and received as well as information on connection quality and jitter for every call.

7.8.3 Call Statistics

The call statistics provide statistical information on voice, TSC, DMC, and data calls.

WBM path:

WBM > Explorers > Statistics > *Call Statistics*

Double-click *Call Statistics* to display the following entries:

> Delete Statistics
> Call Statistics (1 h)
> Call Statistics (24 h)
> Call Statistics (Total)
> Call Statistics (Maximum Parallel)
> LAN Call Statistics
> PBX Call Statistics
> Current connection

7.8.3.1 Delete Statistics

Deletes all statistics (apart from the counters from the last reboot).

WBM path:

WBM > Explorers > Statistics > Call Statistics > (right-click) Delete Statistics

The *Delete Statistics* mask is displayed. Click *Delete* to reset the counters. Click *Cancel to* exit the dialog without making any changes.

7.8.3.2 Call Statistics (1 h)

These statistics list the totals for voice, TSC, DMC, and data calls during the last hour.

WBM path:

WBM > Explorers > (double-click) Call Statistics > *Call Statistics (1h)*

Right-click *Call Statistics (1h)* to display a menu containing the following entry:

> Display Call Statistics (1h)

7.8.3.3 Display Call Statistics (1h)

You can view the totals for voice, TSC, DMC and data calls during the last hour.

WBM path:

WBM > Explorers > (double-click) Call Statistics > (right-click) Call Statistics (1 h) > *Display Call Statistics (1h)*

The *Call Statistics (Last Hour)* mask is displayed. The totals displayed can be split into four categories:

- Voice calls
- TSC calls (**T**emporary **S**ignaling **C**all)
- DMC calls (**D**irect **M**edia **C**onnection)
- Data calls

via LAN or PBX. In all four categories, the display indicates

- the number of successful connections (*... Connected*) and
- the number of calls successfully accepted (*... Received*).

. In addition, the total duration of all connections is displayed in seconds.

7.8.3.4 Call Statistics (24 h)

These statistics list the totals for voice, TSC, DMC, and data calls during the last 24 hours.

WBM path:

WBM > Explorers > (double-click) Call Statistics > *Call Statistics (24h)*

Right-click *Call Statistics (24h)* to display a menu containing the following entry:

> Display Call Statistics (24h)

7.8.3.5 Display Call Statistics (24h)

You can view the totals for voice, TSC, DMC, and data calls for the LAN and PBX during the last 24 hours.

WBM path:

WBM > Explorers > (double-click) Call Statistics > (right-click) Call Statistics (24 h) > *Display Call Statistics (24h)*

The *Call Statistics (Last 24 Hours)* mask is displayed. For a brief description of the data, see Section 7.8.3.3, "Display Call Statistics (1h)".

7.8.3.6 Call Statistics (Total)

These statistics list the totals for voice, TSC, DMC, and data calls for the LAN and PBX since the last reboot.

WBM path:

WBM > Explorers > (double-click) Call Statistics > *Call Statistics (Total)*

Right-click *Call Statistics (Total)* to display a menu containing the following entry:

> Display Call Statistics (Total)

7.8.3.7 Display Call Statistics (Total)

You can view the totals for voice, TSC, DMC, and data calls for the LAN and PBX since the last reboot.

WBM > Explorers > (double-click) Call Statistics > (right-click) Call Statistics (Total) > *Display Call Statistics (Total)*

The *Call Statistics (Total)* mask is displayed. For a brief description of the data, see Section 7.8.3.3, "Display Call Statistics (1h)".

7.8.3.8 Call Statistics (Maximum Parallel)

These statistics list the totals for voice, TSC, DMC, and data calls for the LAN and PBX processed simultaneously by the Gateway during peak load.

WBM path:

WBM > Explorers > (double-click) Call Statistics > *Call Statistics (Maximum Parallel)*

Right-click *Call Statistics (Total)* to display a menu containing the following entry:

> Display Call Statistics (Maximum Parallel)

7.8.3.9 Display Call Statistics (Maximum Parallel)

These statistics list the totals for voice, TSC, DMC, and data calls for the LAN and PBX processed simultaneously by the Gateway during peak load.

WBM > Explorers > (double-click) Call Statistics > (right-click) Call Statistics (Maximum Parallel) > *Display Call Statistics (Maximum Parallel).*

The *Call Statistics (Maximum Parallel)* mask is displayed. For a brief description of the data, see Section 7.8.3.3, "Display Call Statistics (1h)".

7.8.3.10 LAN Call Statistics

LAN calls are connections with other HiPath 3000 nodes (IP trunking) and VCAPI.

These statistics list the voice, TSC, DMC, and data calls received via LAN during the last hour, the last 24 hours, since the last reboot, and all calls processed by the Gateway during peak load.

WBM path:

WBM > Explorers > (double-click) Call Statistics > *LAN Call Statistics*

Right-click *LAN Call Statistics* to display a menu containing the following entry:

> Display LAN Call Statistics

7.8.3.11 Display LAN Call Statistics

These statistics list the total voice, TSC, DMC, and data calls received via LAN during the last hour, the last 24 hours, since the last reboot, and all calls processed by the Gateway during peak load.

WBM path:

WBM > Explorers > (double-click) Call Statistics > (right-click) LAN Call Statistics > *Display LAN Call Statistics*

The *LAN Call Statistics Initiated* mask is displayed. The totals displayed can be split into four categories: one for the past hour, one for the past 24 hours, one for all calls received since the last reboot, and one for calls assigned the property "Maximum Parallel". The number of successful connections (*... Connected*) and the number of calls successfully accepted (*... Received*) are displayed for all categories. In addition, the total duration of all connections is displayed in seconds. All figures apply exclusively to connections conducted over LAN.

7.8.3.12 PBX Call Statistics

PBX calls are calls with system clients.

These statistics list the voice, TSC, DMC, and data calls routed via PBX during the last hour, the last 24 hours, since the last reboot, and all calls processed by the Gateway during peak load.

WBM path:

WBM > Explorers > (double-click) Call Statistics > *PBX Call Statistics*

Right-click *PBX Call Statistics* to display a menu containing the following entry:

> Display PBX Call Statistics

7.8.3.13 Display PBX Call Statistics

You can view the total number of voice, TSC, DMC, and data calls routed via PBX during the last hour, the last 24 hours, since the last reboot, and all calls processed by the Gateway during peak load.

WBM path:

WBM > Explorers > (double-click) Call Statistics > (right-click) PBX Call Statistics > *Display PBX Call Statistics*

The *PBX Call Statistics Initiated* mask is displayed. For a brief description of the data, see Section 7.8.3.11, "Display LAN Call Statistics". All figures from these statistics, however, apply exclusively to connections conducted over PBX.

7.8.3.14 Current connection

Number of currently connected and attempted calls without distinction between call type or origin.

WBM path:

WBM > Explorers > (double-click) Call Statistics > *Current Connections*

Right-click on *Current Connections* to display a menu containing the following entry:

> Current Connections

7.8.3.15 Current Connections

You can view the number of currently connected and attempted calls.

WBM path:

WBM > Explorers > (double-click) Call Statistics > (right-click) Current connection > *Display Current Connections*

The *Current Connections* mask is displayed. The total displayed is the result of the number of currently connected and attempted calls without distinction between call type or origin.

7.8.4 SNMP Statistics

This folder contains statistics on the SNMP protocol including data and field data arising from network traffic.

WBM path:

WBM > Explorers > Statistics > *SNMP Statistics*

Double-click *SNMP Statistics* to display the following entries:

> ifTable Statistics
> IP Statistics
> TCP Statistics
> UDP Statistics

7.8.4.1 ifTable Statistics

These statistics provide a table listing SNMP details on individual interfaces in the network in accordance with RFC 1213 (http://rfc.net/rfc1213.html).

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > *ifTable Statistics*

Right-click *ifTable Statistics* to display a menu containing the following entry:

> Display Statistics Table

7.8.4.2 Display Statistics Table

You can view SNMP details for individual interfaces in the network in accordance with RFC 1213 (http://rfc.net/rfc1213.html).

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > (right-click) ifTable Statistics > *Display Statistics Table*

The *SNMP ifTable Statistics* mask is displayed. Each line in this table represents an evaluated interface in the network. The columns include the following details:

- *ifIndex*: Unique numeric key for the network interfaces.
- *ifDescr*: Information on the network interface, such as product name, manufacturer, etc.
- *ifType*: Type of network interface.
- *ifMtu*: The largest datagram sent or received by the network interface, specified in bytes.
- *ifSpeed*: Current bandwidth in bits per second (bps).
- *ifPhysAddress*: Address of the network interface in the protocol layer.
- *ifAdminStatus*: The required status of the network interface.
- *ifOperStatus*: The current up-to-date status of the network interface.
- *ifLastChange*: Time (system uptime in timeticks) when the last network interface status change was received.
- *ifInOctets*: Total number of bytes received by the network interface (including frame characters).
- *ifInUcastPkts*: Number of subnet unicast packets that were sent on a higher protocol layer.
- *ifInNUcastPkts*: Number of non-unicast packets that were sent on a higher protocol layer (subnet broadcast or subnet multicast packets).
- *ifInDiscards*: Number of packets received but discarded although no error was detected. The packets were discarded to prevent them from being passed on to protocols in higher layers. This may happen when used buffer memory is freed up.

- *ifInErrors*: Number of incoming packets with errors that prevent forwarding to a higher protocol layer.
- *ifInUnknownProtos*: Number of packets received by the network interface that were discarded because of an unidentifiable protocol.
- *ifOutOctets*: Total number of bytes transmitted by the network interface (including frame characters).
- *ifOutUcastPkts*: Number of packets that required a higher protocol layer and were transferred to a subnet unicast address, including packets that were discarded or not sent.
- *ifOutNUcastPkts*: Number of packets that required a higher protocol layer and were transferred to a non-unicast address (subnet broadcast or subnet multicast address), including packets that were discarded or not sent.
- *ifInOutDiscards*: Number of outbound packets which were discarded although no error was detected. The packets were discarded to prevent them from being transmitted. This may happen when used buffer memory is freed up.
- *ifOutErrors*: Number of outbound packets that could not be transmitted on account of errors.
- *ifOutQLen*: Number of packets waiting to be transmitted to the network interface.

7.8.4.3 IP Statistics

These statistics provide details and errors associated with IP routing.

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > *IP Statistics*

Right-click *IP Statistics* to display a menu containing the following entry:

> Display Statistics

7.8.4.4 Display Statistics

You can view IP routing details and errors in accordance with RFC 2011 (http://rfc.net/rfc2011.html).

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > (right-click) IP Statistics > *Display Statistics*

The *SNMP IPSTAT Statistics* mask is displayed. The following details are displayed:

- *ipstatIndex*: Unique key.

- *ipInReceives*: Number of datagrams received, including those with errors.
- *ipInHdrErrors*: Number of datagrams received but discarded because of errors in the IP header (incorrect checksum, incorrect version number, incorrect lifetime, formatting errors, etc.)
- *ipInAddrErrors*: Number of datagrams received but discarded because of errors in the IP address of the recipient (invalid IP address range, etc.).
- *ipForwDatagrams*: Number of datagrams received that were forwarded successfully.
- *ipInUnknownProtos*: Number of datagrams received but discarded with an address that can be resolved locally but invalid protocol.
- *ipInDiscards*: Number of datagrams received but discarded not because of errors but for other reasons (insufficient memory, etc.).
- *ipInDelivers*: Number of datagrams received that were successfully delivered to the IP user protocol, including ICMP.
- *ipOutRequests*: Number of datagrams that supply local IP user protocols (including ICMP) to the IP of an transmission request.
- *ipOutDiscards*: Number of datagrams to be transmitted but discarded not because of errors but for other reasons (insufficient memory, etc.).
- *ipOutNoRoutes*: Number of datagrams to be transmitted but discarded because a route could not be found to the destination.
- *ipReasmTimeout*: Maximum number of seconds reserved for fragments awaiting reassembly.
- *ipReasmReqds*: Number of IP fragments received that need to be reassembled.
- *ipReasmOKs*: Number of successfully reassembled IP datagrams.
- *ipReasmFails*: Number of errors that occurred when reassembling fragments.
- *ipFragOKs*: Number of successfully fragmented IP datagrams.
- *ipFragFails*: Number of IP datagrams that were discarded because of unsuccessful fragmentation (for example, because you set a "non-fragmenting flag").
- *ipFragCreates*: Number of fragments successful created from IP datagrams.

7.8.4.5 TCP Statistics

These statistics contain details and errors associated with the TCP protocol in accordance with RFC 2012 (http://rfc.net/rfc2012.html).

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > (right-click) > *TCP Statistics*

7.8.4.6 Display Statistics

You can view details and errors associated with the TCP protocol.

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > (right-click) TCP Statistics > *Display Statistics*

The *SNMP TCPSTAT Statistics* mask is displayed. The following details are displayed:

- *tcpstatIndex*: Unique key.
- *tcpRtoAlgorithm*: Algorithm used for the timeout to deal with unrecognized bytes. 2 = constant re-transmission timeout, 3 = "MIL-STD-1778, Appendix B" algorithm, 4 = "Van Jacobson" algorithm, 1 = none of the previously mentioned algorithms.
- *tcpRtoMin*: Minimum value permitted for the retransmission timeout, measured in milliseconds.
- *tcpRtoMax*: Retransmission timeout, measured in milliseconds.
- *tcpMaxConn*: Maximum number of TCP connections supported by this network interface. A value of -1 means that the maximum number of connections is dynamic.
- *tcpActiveOpens*: Number of cases in which a TCP connection switches directly from closed status to syn-sent status.
- *tcpPassiveOpens*: Number of cases in which a TCP connection switches directly from listen status to syn-rcvd status.
- *tcpAttemptFails*: Number of cases in which a TCP connection switches directly from syn-sent status or syn-rcvd status to closed status, and at the same time the cases in which a TCP connection switches directly from syn-rcvd status to listen status.
- *tcpEstabResets*: Number of cases in which a TCP connection switches directly from established status or from close-wait status to closed status.
- *tcpCurrEstab*: Number of TCP connections currently in "established" or "close-wait" status.
- *tcpInSegs*: Total number of segments received, including those with errors. This counter also includes TCP connections currently open.
- *tcpOutSegs*: Total number of segments transmitted, including those from TCP connections currently open. This does not include segments containing bytes that were transferred repeatedly.

- *tcpRetransSegs*: Total number of segments retransmitted, i. e. segments with bytes which have already been transmitted one or more times.
- *tcpInErrs*: Number of segments received with errors (for example, incorrect checksums).
- *tcpOutRsts*: Number of segments transmitted containing an RST flag.

7.8.4.7 UDP Statistics

These statistics contain details and errors associated with the UDP protocol in accordance with RFC 2013 (http://rfc.net/rfc2013.html).

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > (right-click) > *UDP Statistics*

7.8.4.8 Display Statistics

See UDP Statistics.

You can view details and errors associated with the UDP protocol.

WBM path:

WBM > Explorers > (double-click) SNMP Statistics > (right-click) UDP Statistics > *Display Statistics*

The *SNMP UDPSTAT Statistics* mask is displayed. The following details are displayed:

- *udpstatIndex*: Unique key.
- *udpInDatagrams*: Total number of UDP datagrams delivered to UDP users.
- *udpNoPorts*: Total number of UDP datagrams received that could not be delivered because there is no application at the destination port.
- *udpInErrors*: Total number of UDP datagrams received that could not be delivered for other reasons.
- *udpOutDatagrams*: Total number of UDP datagrams sent.

8 Web Based Simulation Tool

This chapter describes how to install and use the Web-based Simulation Tool (WST) for creating off-line configurations. You can save these configurations in files that can be loaded to the relevant HG 1500 board using WBM or CLI.

8.1 Installation

8.1.1 General information

This following minimum requirements for WBM also apply to the WST:

> WBM is composed of HTML/XSL pages with frames. To use it, the following must be installed:
> - Windows 98SE, NT 4.0, 2000 or XP
> - Java plug-in JRE 1.3.1
> - Microsoft Internet Explorer 5.5 or 6.0
> - XML Extension DLL V3.0 SP2 or SP4
> - Explorer settings must permit the use of ActiveX and Java.

Other browsers that support frames, Java and JavaScript may also be compatible with WBM. Browsers that do not support frames cannot be used with WBM.

> To operate WBM, you will need a PC with the following minimum requirements:
> - 128 MB main memory (RAM)
> - 400 MHz processor speed
> - a mouse with left and right buttons

8.1.2 Installation

To install the WST on an administration computer:

1. Copy the "*HiPathWST.<configuration>.HI-G15.3A.<nnn>.zipHiPathWST[...].zip*" file to a root directory that you created earlier.
2. Unzip the zip file in this root directory. When unzipping the file, make sure that the folder names of the compressed files are maintained.

8.2 Starting Simulation

The simulation session consists of two stages:

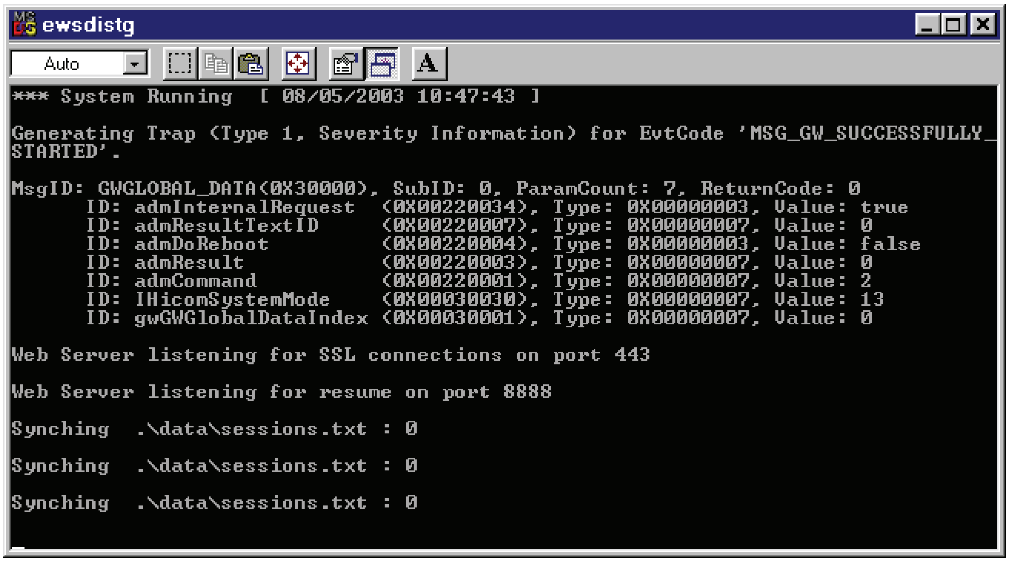
- Starting the WST Console
- Starting the WBM

8.2.1 Starting the WST Console

The *wbm_test* root directory contains the executable file *wst.exe*. This file generates a console window that contains the same displays as a HG 1500 console.

You can double-click the file *wst.exe* in Windows-Explorer to open it. Or you can select *Run* in the Windows Start menu and start the file in this way.

1. Open the file *wst.exe*. The console is started in an MS-DOS window.



```
*** System Running  [ 08/05/2003 10:47:43 ]

Generating Trap (Type 1, Severity Information) for EvtCode 'MSG_GW_SUCCESSFULLY_
STARTED'.

MsgID: GWGLOBAL_DATA(0X30000), SubID: 0, ParamCount: 7, ReturnCode: 0
      ID: admInternalRequest  (0X00220034), Type: 0X00000003, Value: true
      ID: admResultTextID     (0X00220007), Type: 0X00000007, Value: 0
      ID: admDoReboot         (0X00220004), Type: 0X00000003, Value: false
      ID: admResult           (0X00220003), Type: 0X00000007, Value: 0
      ID: admCommand          (0X00220001), Type: 0X00000007, Value: 2
      ID: IHicomSystemMode    (0X00030030), Type: 0X00000007, Value: 13
      ID: gwGWGlobalDataIndex (0X00030001), Type: 0X00000007, Value: 0

Web Server listening for SSL connections on port 443

Web Server listening for resume on port 8888

Synching  .\data\sessions.txt : 0

Synching  .\data\sessions.txt : 0

Synching  .\data\sessions.txt : 0

_
```

2. Wait for the `Web Server listening for ...`console to appear.

   Leave the console window open. Otherwise, the simulation will end.

> You can also explicitly assign the simulator when a specific IP address is started. This is recommended, for example, if the simulator is started on a computer that has multiple IP addresses or if you are working on multiple computers and do not want to have to remember the current IP address. To start the simulator with a specific IP address, specify the IP address when running the *wst.exe* file. Example:
> *wst.exe* `192.168.101.118`
> You can enter the address parameter at callup if you select *Run* in the Windows Start menu and enter the IP address after the program name in the input field or by creating an appropriate batch file with a text editor, for example, *}hg1500simulator.bat* which contains a callup of this kind. You can then double-click the batch file like a program in Windows-Explorer.
> We recommend entering 127.0.0.1 as the IP address for local access in the case of PCs with multiple network interfaces (IP addresses). The simulation uses the PC's first IP address if the IP address is not specified. The correct IP address should be configured when using the simulation on a second PC with multiple IP addresses.

8.2.2 Starting the WBM

You can start the WBM in the Web browser once the console is running.

1. Open the Internet browser. Check the Internet browser language setting: If you want to use the WBM in German, the language setting for the browser (menu *Tools* > *Internet Options* > *Language*) must first be set to *German (Germany) [de]*.At present the WBM can be run in either German or English.

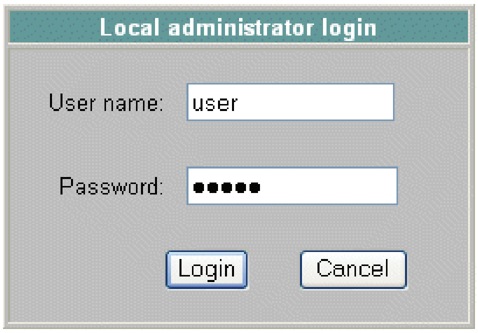
2. Enter the correct IP address for the scenario as a URL:
   http://`num.num.num.num:8085` (`num` is a number between 0 and 255).

   The port number 8085 must be entered as shown.
   `num.num.num.num` is the IP address of the computer where the *wst.exe* file was started.
   Examples:

   `http://192.168.101.118:8085` (WST was started on a computer in the LAN)

   `http://127.0.0.1:8085` (WST was started on the local computer – this always has the "loopback" address 127.0.0.1).

A login page appears when you log on to a session for the first time:



Local administrator login

User name: user

Password: ●●●●●

This page also provides information on software requirements and links for downloading this software.

3. **User name:** Enter the user name ("**31994**").
4. **Password:** Enter the password for the respective user name ("**31994**").
5. Click *Login*.

   The WBM download operation begins. Wait until the WBM home page has been completely loaded.

You can now use the WBM simulation.

8.3 Ending the Simulation Session

To end the simulation session:

1. Ensure that you have saved all new or modified configurations.
2. Click the *Logoff* module in the WBM window.
3. Close the Internet browser.
4. Close the WST console window.

8.4 Sample Applications

8.4.1 Basic Settings for an Individual Gateway

To make the basic settings for an individual gateway:

1. Collect the configuration data for the gateway.
2. Start WST and WBM.
3. Click the Padlock icon to activate write access (if not already active).
4. Reset the configuration to the factory settings (*Maintenance* > *Configuration* > (right-click) *Reset Configuration to Factory Default ...*).
5. The configuration should comply with the recorded data.
6. Save the new configuration.
7. Load all configuration tables to a file.

   To do this, open the download dialog and choose *Select All Tables* (*Maintenance* > *Configuration* > *Load from Gateway* > (right-click) *Load via HTTP*).

You can use WBM to load this configuration file to a gateway and activate the new configuration there.

8.4.2 Basic Settings for Multiple Gateways (Copying the Configuration)

Proceed as follows to make the basic settings for multiple gateways:

1. Collect the configuration data for the gateways.
2. Start WST and WBM.
3. Click the Padlock icon to activate write access (if not already active).
4. Reset the configuration to the factory settings (*Maintenance* > *Configuration* > (right-click) *Reset Configuration to Factory Default ...*).
5. Set the configuration for the data that is identical for all gateways. The configuration should comply with the recorded data.
6. Save the new configuration.
7. Load all configuration tables to a file.

   To do this, open the download dialog and choose *Select All Tables* (*Maintenance* > *Configuration* > *Load from Gateway* > (right-click) *Load via HTTP*).

8. Copy the configuration file just created in Windows Explorer and give each copy a name that indicates the gateway for which the data was generated.
9. Load the configuration file for the first gateway back to WST (*Maintenance* > *Configuration* > *Load to Gateway* > (right-click) *Load via HTTP*).
10. Edit the specific data for this gateway. Load all configuration tables to a file.
11. Repeat steps 9 and 10 for every gateway you want to configure.
12. Load the configuration via WBM to the relevant gateway and activate the configuration.

8.4.3 Basic Settings for Multiple Gateways (Multigateway Administration)

Proceed as follows to make the basic settings for multiple gateways:

1. Collect the configuration data for the gateways.
2. Start WST and WBM.
3. Click the Padlock icon to activate write access (if not already active).
4. Reset the configuration to the factory settings (*Maintenance* > *Configuration* > *Reset Configuration to Factory Default ...*).
5. Set the configuration for the data that is identical for all gateways. The configuration should comply with the recorded data.
6. Save the new configuration.
7. Create a list of the gateways to which these configuration tables should be loaded (*Maintenance* > *Multigateway Admin* > *List of Gateways* > (right-click) *Add Gateway*).

   > Ensure that the gateways listed can be transferred.

8. Select the tables to be distributed (*Maintenance* > *Multigateway Admin* > *List of Configuration Tables* > (right-click) *Edit List of Configuration Tables*).
9. Distribute the configuration tables to the assigned gateways (*Maintenance* > *Multigateway Admin* > *Distribution* > *Distribute Configuration*).
10. Use WBM to edit the specific data for every gateway. Save the configuration and perform a restart.

> You should save the gateway data in a file after modifying the configuration.

8.4.4 Modifying the Configuration for a Single Gateway

To modify the configuration for an individual gateway:

1. Collect the configuration data for the gateway.
2. Start WST and WBM.
3. Click the Padlock icon to activate write access (if not already active).
4. Load the configuration file for the gateway into the WST (*Maintenance* > *Configuration* > *Load to gateway* > (right-click) *Load via HTTP*).
5. Edit the specific data for this gateway. Load all configuration tables back to a file.

   To do this, open the download dialog and choose *Select All Tables* (*Maintenance* > *Configuration* > *Load from Gateway* > (right-click) *Load via HTTP*).

You can use WBM to load this configuration file to a gateway and activate the new configuration there.

8.4.5 Modifying the Configuration for Multiple Gateways (Multigateway Administration)

If you want to make the same changes for a number of gateways:

1. Collect the configuration data for the gateways.
2. Start WST and WBM.
3. Click the Padlock icon to activate write access (if not already active).
4. Load the configuration file for the gateway back to WST (*Maintenance* > *Configuration* > *Load to Gateway* > (right-click) *Load via HTTP*).
5. Set the configuration for the data that is identical for all gateways. The configuration should comply with the recorded data.
6. Save the modified configuration.
7. Create a list of the gateways to which these configuration tables should be loaded (*Maintenance* > *Multigateway Admin* > *List of Gateways* > (right-click) *Add Gateway*).

   > Ensure that the gateways listed can be transferred.

8. Select the tables to be distributed (*Maintenance* > *Multigateway Admin* > *List of Configuration Tables* > (right-click) *Edit List of Configuration Tables*).
9. Use the WBM to save the modified configuration at every gateway and perform a restart.

ⓘ You should save the gateway data in a file after modifying the configuration.

8.4.6 Offline Diagnostics

To facilitate diagnostics with original gateway data in WST:

1. Use the WBM's maintenance module to save the configuration data and the Admin, Events and Trace log data in files.
2. Start WST and WBM.
3. Click the Padlock icon to activate write access (if not already active).
4. *Load* the configuration file for the gateway into the WST (*Maintenance* > *Configuration* > Load to gateway > (right-click) *Load via HTTP*).
5. Save the data and restart the WST.
6. Open the log files using a text editor.

You can now search the WST for configuration errors.

8.5 Restrictions

The following functions are not available in WST because:

- the relevant data is loaded from the HiPath 3000 and only displayed on the HG 1500,
- the operating system does not support certain functions,
- this function is not implemented in the simulator or
- an existing gateway is needed for this function.

User Accounts

The user accounts are transferred from the HiPath 3000 system and cannot be edited in WBM.

As the simulation is not linked to a HiPath 3000, two permanent IDs are set ("root" and "31994").

DID Numbers

The DID numbers for system clients and H.323 clients are transferred from a HiPath 3000 system and cannot be edited in WST.

Loading Updates

It only makes sense to load software images and firmware to a real gateway. Although software images and firmware can be loaded to WST, they cannot be activated.

E-Mail

As the SMTP functionality is not implemented in WST, the function *Maintenance* > *Events* > *E-mail* cannot be used.

Command Line CLI

You can open a window in WBM for displaying gateway outputs (e.g. traces) and for entering CLI commands that are sent to the gateway over a V.24 interface.

Although you can display the gateway outputs in this window in WST, you cannot enter CLI commands.

SNMP

No SNMP functions are available.

RADVision Stack Traces

RADVision stack traces are not possible in WST. The same applies to the configuration of RADVision stack trace exports and imports.

Reset

Some changes and actions necessitate a restart.

WST does not support the restart functionality. Instead, the simulation is terminated and you must restart it.

Operating Mode

The operating mode is adopted by the HiPath 3000 system when the board is started. A fixed value is set by default in WST and can be displayed under *Explorers* > *Basic Settings* > *System* > *Software Build*.

Hardware Information

As real HG 1500 boards are not used for simulation, simulated values are entered for all hardware data.

Statistics

As you cannot set up calls with WST, the statistics contain simulated or "root" values.

Front panel

Apart from the configured channels, all information in the graphic representation of the front panel contains simulated values.

SSL

SSL data cannot be opened with the WST. The relevant entry under *Security* in the Explorers module is therefore unavailable.

VPN

VPN data cannot be opened with the WST. The relevant entry under *Security* in the Explorers module is therefore unavailable.

8.6 Access to a Gateway

The administration computer (on which the simulation tool is active) must be connected to the gateway whenever configuration data should be loaded from or to a real, existing gateway.

To do this, you must ensure that:

- HTTP/HTTPS connections are not obstructed by a firewall.
- IP routing permits remote access.

9 Technical Concepts

A number of administrable HG 1500 functions require a more comprehensive understanding of technical details. This chapter contains sections that deal with these technical details.

9.1 Environmental Requirements for VoIP

Relevant WBM functions:

See Section 7.3.2, "LAN1 (LAN1)"
See Section 7.3.3, "LAN2 ([not used])"
See Section 7.7.4, "Media Stream Control (MSC)"
See Section 7.7.5, "HW Modules"
See Section 7.8.2, "MSC Statistics"

To ensure voice transfer quality and avoid unacceptable delays, the networks being used must meet certain requirements.

9.1.1 Environmental Requirements in the LAN

LANs used for VoIP must meet the following specifications:

- At least 256 Kbps transmission capacity per networked unit
- Not more than 50 msec delay in one direction (One Way Delay) Not more than 150 msec total delay
- Not more than 1% packet loss
- QoS support – IEEE 802.1p, DiffServ (RFC 2474) or ToS (RFC 791)
- Every HG 1500 must be connected via a switch or a dedicated port of a router.
- It is recommended that the VoIP application be connected via a separate VLAN to reduce collisions with other transmissions. If all involved devices support VLAN (in accordance with IEEE 802.1q), all VoIP traffic can be placed in a separate VLAN. For administration access, LAN switches must provide individual PCs with access to multiple VLAN segments.
- Not more than 20% of the available bandwidth should be used.
- Not more than 10% of the total data traffic should be broadcast packets.
- The error rate should not amount to more than 1% of data traffic and should not tend to increase.

9.1.2 Environmental Requirements in the WAN

LANs that are linked over WANs and share the same VoIP functionality must meet the following minimum requirements:

- Each LAN must each be connected to the Internet via DSL with a fixed IP address.
- QoS support – IEEE 802.1p, DiffServ (RFC 2474) or ToS (RFC 791) – over the entire connection
- The bandwidth required for the calls must always be available in both directions, to the network and to the user.
- Not more than 50 msec delay in one direction (One Way Delay) Not more than 150 msec total delay
- Not more than 3% packet loss
- Not more than 3% error rate
- Not more than 10% jitter
- As little broadcast and multicast traffic in the network as possible. If necessary this can be achieved by structuring the network – using VPN, for instance – with Layer 3 switches and routers, or with Layer 2 switches that recognize multicasting.
- Not more than 40% network load (without VoIP traffic)
- Less than 40 broadcast packets per second if possible

9.2 Bandwidth Requirements in LAN/WAN Environments

Relevant WBM functions:

See Section 7.3.2, "LAN1 (LAN1)"
See Section 7.3.3, "LAN2 ([not used])"
See Section 7.5.3.2, "Edit Codec Parameters"

The HG 1500 is configured for optimal bandwidth usage. It implements various functions for this, including:

- silence suppression
- background noise detection and suppression
- dynamic voice and fax detection

Bandwidth Availability

The bandwidth required for voice must be available at all times in the network. You must measure and analyze the network to ensure this is the case before installing components.

Payload connections with RTP (Real-Time Transport Protocol) in a LAN environment:

The bandwidth required for voice transmission in an IP network can be calculated using the following table:

Codec type	Packetizing parameter	Packet interval/ Frame size (msec)	Payload (bytes)	Ethernet packet length (bytes)	Payload packet (overhead in percent)	Ethernet Load (incl.) header (Kbps)
G.711	20	20	160	230	44%	92
G.711	30	30	240	310	29%	82.7
G.711	40	40	320	390	22%	78
G.711	60	60	480	550	15%	73.3
G.723.1	1	30	24	94	292%	25.1
G.723.1	2	60	48	118	146%	15.7
G.729A	1	20	20	90	350%	36
G.729A	2	40	40	110	175%	22
G.729A	3	60	60	130	117%	17.3
RTCP		5000		280		0.4

Table 9-1 Codec-Based Bandwidth Requirements

The LAN load is calculated for a single route. The bandwidth must be doubled for payload connections in both directions. HG 1500 supports VAD with codecs G.7231A and G.729AB. If you use these codecs, bandwidth requirements vary in relation to the length of idle periods in voice signals.

VLAN tagging based on IEEE 802 1q is also performed as part of the calculation. Packet length is shorter by 4 bytes without VLAN tagging.

The overhead is calculated as follows:

Protocol	**Bytes**
RTP header	12
UDP header	8
IP header	20
802.1Q VLAN tagging	4
MAC (incl. preamble, FCS)	26
Total	**70**

Table 9-2 Overhead Calculation

Report type	**Report interval (sec)**	**Average Ethernet packet size (bytes)**	**Ethernet Load (incl.) header (Kbps)**
Sender report	5	140	0.2
Recipient report	5	140	0.2
Total			**0.4**

Table 9-3 Payload Connection Check with Parallel RTCP (Real-Time Transport Control Protocol)

Payload connections with RTP (Real-Time Transport Protocol) in a WAN environment:

The following values apply to payload connections with RTP (Real-Time Transport Protocol) in a WAN environment:

Codec	**Packetizing parameter**	**Packet interval/ Frame size (msec)**	**Payload (bytes)**	**Packet length (bytes)**	**Payload packet (overhead in %)**	**WAN load (Kbps)**	**Packet length with header compression (bytes)**	**WAN load with header compression (Kbps)**
G.711	20	20	160	206	29%	82.4		
G.711	30	30	240	286	19%	76.3		
G.711	40	40	320	366	14%	73.2		
G.711	60	60	480	526	10%	70.1		
G.723.1	1	30	24	70	192%	18.7	32	8.5
G.723.1	2	60	48	94	96%	12.5	56	7.5

Table 9-4 WAN bandwidth requirements according to Codec

Codec	Packetizing parameter	Packet interval/ Frame size (msec)	Payload (bytes)	Packet length (bytes)	Payload packet (overhead in %)	WAN load (Kbps)	Packet length with header compression (bytes)	WAN load with header compression (Kbps)
G.729A	1	20	20	66	230%	26.4	28	11.2
G.729A	2	40	40	86	115%	17.2	48	9.6
G.729A	3	60	60	106	77%	14.1	68	9.1
RTCP		5000		230		0.4		0.4

Table 9-4 WAN bandwidth requirements according to Codec

The WLAN load is calculated for a single direction. As WLAN channels usually contain channels in both directions, this is the same as the bandwidth requirement, for example, for one ISDN channel.

The overhead is calculated as follows:

Protocol	Bytes
RTP header	12
UDP header	8
IP header	20
PPP	9
Total	**46**
Compressed header	**8**

Table 9-5 Overhead Calculation

A "compressed header" is usually used for RTP/UDP/IP Header compression. In addition every 5 seconds a full header is sent (total = 46 octets).

The rule of thumb for calculating the bandwidth requirement for n parallel VoIP connections with G.711 (one frame per RTP packet) is:

$\text{Bandwidth}_{\text{LAN}} = n \times (180_{\text{voice payload}} + 0.4_{\text{RTPC}})$

$\text{Bandwidth}_{\text{WAN}} = n \times (82_{\text{voice payload}} + 0.4_{\text{RTPC}})$

The approximate values for voice payload changes for other codecs or packet values. In addition, the bandwidth for Attendant P, call charge information, and other applications must also be taken into account.

Bandwidth requirements for CAR Alive/Node Survey

There are two different methods for performing a CAR-Alive/Node Survey: either a TCP-based mechanism or an ICMP ping (configurable with Manage I or WBM).

Node Number	TCP load (Kbps)	Ping load (Kbps)	Time-out
1	0.1	0.1	12
2	0.2	0.3	
3	0.5	0.8	
4	1.0	1.7	
5	1.7	2.8	
6	2.5	4.2	

Table 9-6 LAN Bandwidth Requirement for CAR-Alive/Node Survey

Node Number	TCP load (Kbps)	Ping load (Kbps)
1	0.07	0.11
2	0.14	0.22
3	0.41	0.66
4	0.82	1.31
5	1.37	2.19
6	2.06	3.28

Table 9-7 WAN Bandwidth Requirement for CAR-Alive/Node Survey

The rule of thumb for calculating the bandwidth requirement for CAR-Alive between n nodes is:

$$\mathbf{Bandwidth_{LAN} = n \times (n-1) \times bytes_{AliveMsg} \times 8 \div 1000 \div T_{timeout\ between\ ping}}$$

and the rule of thumb for calculating the bandwidth requirement for CAR-Alive between n nodes at the HG 1500 interface is:

$$\mathbf{Bandwidth_{LAN} = (n-1) \times (n-1) \times bytes_{AliveMsg} \times 8 \div 1000 \div T_{timeout\ between\ ping}}$$

The value for $\mathbf{bytes_{AliveMsg}}$:

in the LAN is **212** with ping or **127** with TCP
in the WAN is **188** with ping or **102** with TCP

The default timeout between two pings is 12 seconds.

The following table contains information on additional bandwidth requirements for signals:

Device/application	BHCA	Load (Kbps)
DSS server, outgoing and incoming calls	1400	2
Attendant P (busy)	1400	3
Call charge information	1400	1
ACD information	1400	10
Fax over VCAPI, 14400 bauds		2
CDB synchronization system with DBFS (TFTP, burst)		162

Table 9-8 Bandwidth Requirements for Signals

Bandwidth requirements in LAN environments with encryption

Encryption requires increased bandwidth. The following tables list the bandwidth requirements depending on the possible voice codecs and encryption algorithms for Ethernet packets. Encryption is performed by an IPsec protocol stack. Only one of the many operating modes available for IPsec is considered here: the ESP tunnel mode with authentication.

This operation mode offers the highest level of security for site-to-site VPNs.

Protocol	Bytes	Encrypted?
ESP Trailer	12	
ICMP Padding	varies (**y**)	encrypted
ICMP Padding Header	2	encrypted
Voice Payload	varies (**x**)	encrypted
RTP	12	encrypted
UDP	8	encrypted
IP (original)	20	encrypted
ESP Header	8 + **IV***	
IP (Tunnel)	20	
802.1Q VLAN tagging	4	
MAC (incl. preamble, FCS)	26	
Total	**112 + IV + x + y**	

Table 9-9 Structure of an encrypted voice packet (ESP tunnel mode with authentication)

* IV = initializing vector. For an explanation see the text below the table

ESP Header Length: The length of the ESP header depends on the encryption algorithm used. When using cipher block chaining, the ESP header contains an initialization vector (marked "IV" in the table above). The length of the initialization vector is identical to the length of a encryption block.

Padding: Padding with bytes is necessary because the encryption algorithm is based on block encryption. The entire encrypted portion of the packet (original IP/UDP/RTP Header, Voice Payload, ESP Padding Header, ESP Padding) must be an integer value that is a fraction of the encryption block length.

Encryption algorithm	Block length	Length of initialization vector
AES	16 bytes (128 bits)	16 bytes (128 bits)
DES	8 bytes (64 bits)	8 bytes (64 bits)
3DES	8 bytes (64 bits)	8 bytes (64 bits)

Table 9-10 Block Lengths of the Encryption Algorithms

The number of padding bytes needed for voice packets is calculated using the following formula:

(42 + x + y) [bytes] = N x (8 or 16 [bytes) // N is an integer.

Bandwidth calculation for the AES encryption algorithm:

Codec	Packeting	Sample size (msec)	Payload (bytes)	Padding (bytes)	Ethernet packet length	Payload packet (overhead in %)	Ethernet load incl. preamble (Kbps)
G.711	20	20	160	6	**294**	75%	**117.6**
G.711	30	30	240	6	**372**	50%	**99.2**
G.711	40	40	320	6	**454**	38%	**90.8**
G.711	60	60	480	6	**614**	25%	**81.9**
G.723.1	1	30	24	**14**	**166**	500%	**44.3**
G.723.1	2	60	48	6	**182**	250%	**24.3**
G.729A	1	20	20	2	**150**	600%	**60.0**
G.729A	2	40	40	**14**	**182**	300%	**36.4**
G.729A	3	60	60	**10**	**198**	200%	**26.4**

Table 9-11 LAN Bandwidth Requirement with AES Encryption – By Codec

Bandwidth calculation for the DES/3DES encryption algorithm:

Codec	Packet-ing	Sample size (msec)	Pay-load (bytes)	Padding (bytes)	Ethernet packet length	Payload packet (overhead in %)	Ethernet load incl. preamble (Kbps)
G.711	20	20	160	6	**286**	75%	**114.4**
G.711	30	30	240	6	**366**	50%	**97.6**
G.711	40	40	320	6	**446**	38%	**89.2**
G.711	60	60	480	6	**606**	25%	**80.8**
G.723.1	1	30	24	**6**	**150**	500%	**40.0**
G.723.1	2	60	48	6	**174**	250%	**23.2**
G.723.1	**3**	**90**	**72**	**6**	**198**	**167%**	**17.6**
G.729A	1	20	20	2	**142**	600%	**56.8**
G.729A	2	40	40	**6**	**166**	300%	**33.2**
G.729A	3	60	60	**2**	**182**	200%	**24.3**

Table 9-12 LAN Bandwidth Requirement with DES/3DES Encryption – By Codec

Bold typeface is used to highlight values that are not identical in both tables.

9.3 Quality of Service (QoS)

Relevant WBM functions:

See Section 7.3.2, "LAN1 (LAN1)"
See Section 7.3.3, "LAN2 ([not used])"
See Section 7.4.4.6, "PSTN peers"
See Section 7.1.7, "Quality of Service"
See Section 7.7.2, "QoS Data Collection"

Quality of Service encompasses various methods for guaranteeing certain transmission properties in packet-oriented networks (IP).

It is thus important, for example, to ensure a minimum bandwidth for Voice over IP for the entire duration of the transfer operation. If multiple applications with equal rights are operating via IP, then the available bandwidth for the transmission path (e. g. an ISDN B channel, 64 Kbps) is split. In this case, a voice connection may experience packet losses which can reduce voice quality.

HG 1500 uses various different procedures to implement Quality of Service.

On layer 2 (in accordance with OSI, Ethernet), you can activate an extension (IEEE 802.1p) to the standard Ethernet format (DIX V2). This adds more information to the Ethernet header including a 3-bit data field. This field carries priority information on the data packet. For all packets that reach the board from the LAN, both Ethernet formats (IEEE 802.1p and DIX V2) are understood; the format can be selected for all packets that are sent from the board to the LAN. You should check whether all components in the network support this format before this parameter is activated. Otherwise, it may not be possible to access HG 1500 from the LAN anymore.

The Ethernet header is not transported when switching to another transport medium (e. g. ISDN). An IP router (like the HG 1500's router) can, however, use the information contained in the IP header for prioritization. Straightforward IP routers that connect two network segments, for example, can use the IP level prioritization. In the case of the QoS procedure, either three bits (IP precedence based on RFC 791, older standard) or six bits (Differentiated Services or DiffServ, based on RFC 2474) are evaluated for the creation of various classes. HG 1500's IP router provides various bandwidths for these classes, so that voice packets can be processed first.

For the DiffServ parameter, various so-called codepoints ("Basic Settings > AF/EF Codepoints") are defined, and based on these codepoints two different procedures are used for processing the payload of different marked data flows:

The "Expedited Forwarded (EF)" procedure (based on RFC 2598) guarantees a constant bandwidth for data in this class. If this defined value is reached, all packets that exceed this bandwidth are rejected. A separate class is defined for EF on HG 1500. For this class, the bandwidth can be defined as a percentage for every ISDN peer (QoS bandwidth for EF).

The "Assured Forwarding (AF)" procedure (based on RFC 2597) guarantees a minimum bandwidth for the data of one (of many) classes. Lower priority classes share the bandwidth not used by EF or the classes with higher priority. In addition, the speed at which packets are rejected if the system is unable to forward them fast enough can be defined for every class by means of the Dropping Level setting. Nothing is thus to be gained by buffering voice packages for an extended period of time (this only increases the delay). In the case of secure data transfer (e. g. file transfer), on the other hand, a large buffer is advantageous as packets are otherwise sent repeatedly between the two terminals.

Four classes are reserved for AF on the HG 1500: AF1x (low priority) , AF2x, AF3x and AF4x (high priority), where "x" stands for one of three dropping steps: low (1), medium (2) and high (3). In the case of "low", packets are buffered over an extended period, in the case of "high", packets are promptly rejected if they cannot be forwarded. Unmarked IP packets (ToS field=00) are handled in the same way as the lowest priority.

If a routing partner can only work with one of the two standards (DiffServ or IP precedence, for example an older router that only works with IP precedence), then HG 1500 can translate the ToS field accordingly. This can be set for each PSTN peer or LAN interface. When the default value is set ("identical"), nothing is translated; with the values "DiffServ" or "IP Precedence", translation is performed on the basis of the table below, if data is not entered in the field in accordance with the standard set.

In the case of IP data traffic, the IP packets generated by the HG 1500 are split into five groups (e. g. the VCAPI server, H.323 Gateway). You can set which codepoint is to be used for marking the packets for four of these groups.

- Voice Payload for IP telephony (Voice over IP)
- Call signaling for connection setup with H.323/SIP
- Data Payload, for example, for IP networking with fax or modem
- Network Control, for example, SNMP traps

The remaining data traffic is marked "disabled", that is 00.

The different DiffServ codepoints and Siemens default settings are displayed in the following table.

Layer 3 QoS values										
DSCP (Differentiated Services Codepoint)							**Siemens default**	**Total TOS byte**		
				Drop level						
Name	**Binary**	**Hex**	**Dec.**	**high**	**med**	**low**		**Binary**	**Hex**	**Dec.**
DE (default)	0	0	0				All other packets	0	0	0
AF 11	1010	0A	10			x		101000	28	40
AF 12	1100	0C	12		x			110000	30	48
AF 13	1110	0E	14	x				111000	38	56
AF 21	10010	12	18			x		1001000	48	72
AF 22	10100	14	20		x			1010000	50	80
AF 23	10110	16	22	x				1011000	58	88
AF 31	11010	1A	26			x	Signaling	1101000	68	104
AF 32	11100	1C	28		x			1110000	70	112
AF 33	11110	1E	30	x				1111000	78	120
AF 41	100010	22	34			x		10001000	88	136
AF 42	100100	24	36		x			10010000	90	144
AF 43	100110	26	38	x				10011000	98	152

Table 9-13 Codepoint implementation

Layer 3 QoS values										
DSCP (Differentiated Services Codepoint)							Siemens default	Total TOS byte		
				Drop level						
Name	Binary	Hex	Dec.	high	med	low		Binary	Hex	Dec.
EF	101110	2E	46				Voice/fax/ modem	10111000	B8	184
CS7	111000	38	56		x		Network control	11100000	E0	224

Table 9-13 Codepoint implementation

Layer 2 QoS values		
Binary	Hex	Siemens default
000	0	All other packets
000	0	Network control
011	3	Signaling
110	5	Fax/modem
110	5	Voice

Table 9-14 Codepoint implementation

If there are only layer 3 priorities, as is the case with routing for example, only layer 2 tags are set for packets with layer 3 TOS values that correspond to the TOS value of one of the four priority classes defined under Basic settings -> Quality of Service.

9.4 Configuration Rules for HG 1500 V8 in HiPath 3000 V6

Relevant WBM functions:

See Section 7.1.7, "Quality of Service"
See Section 7.3.2, "LAN1 (LAN1)"
See Section 7.3.3, "LAN2 ([not used])"
See Section 7.4.4.6, "PSTN peers"
See Section 7.5.7, "Clients"

9.4.1 Static Configuration Rules

In HiPath 3000/5000 version 6.0, HG 1500 makes the resources described in Table 9-15 available in HG 1500 boards that have been defined as media gateways (= gateway HG 1500).

Table 9-16 shows the capacity limits (maximum numbers) of the relevant functions for each specific board.

Table 9-15 Technical data (resources) of the HG 1500 boards defined as media gateways

Resource	**HXGM3**			**HXGS3** **HXGR3**		**STMI2**
	without PDM1	**with 1 x PDM1**	**with 2 x PDM1**	**without PDM1**	**with 1 x PDM1**	**without PDMX***
Routing Channels A routing channel is used, for example, to set up a connection between two IP networks via ISDN (ISDN routing).	16			16		16
Gateway Channels (DSP Channels) A gateway channel is needed, for example, for the connection between an IP workpoint client and a TDM workpoint client (e.g. optiPoint 500) as well as to connect to the ITSP. Two gateway channels are needed to connect to an ITSP.	16	24	32	8	16	32
Fax/modem Channels (G.711)	16	24	32	8	16	32
Fax Channels (T.38) These are special HW resources that make it possible to use the Fax over vCAPI and the Fax over IP functions with the T.38 protocol.	3			2		3

Table 9-15 Technical data (resources) of the HG 1500 boards defined as media gateways

Resource	**HXGM3**			**HXGS3** **HXGR3**		**STMI2**
	without PDM1	**with 1 x PDM1**	**with 2 x PDM1**	**without PDM1**	**with 1 x PDM1**	**without PDMX**[*]
Teleworker with AES encryption and the G.711/G.729 codec[**] (sample rate ≥ 20 ms)	10			8		10
Teleworker with AES encryption and the G.723 codec (sample rate ≥ 30 ms)	16			12		16
DMC Channels These are the gateway channels for direct media connections (DMC) with HiPath 4000 (DMC interworking feature is enabled.[***]).	12	18	24	6	12	24
MOH Channels (G.711, G.723, G.729) The number of available MOH channels depends on the configuration (HiPath 3000/5000 Manager E).	5			5		5
LAN Connections which can be used as Internet telephony connections	2 1			2 1		2 1

[*] PDMX is currently not released.

[**] G.729 is currently not supported by optiClient 130 V4.0.

[***] The number of available gateway channels (DSP channels) is reduced as soon as the DMC interworking feature is enabled via HiPath 3000/5000 Manager E.

Table 9-16 HG 1500 – Board-specific capacity limits (maximum numbers)

Function	**HXGM3**			**HXGS3** **HXGR3**		**STMI2**
	without PDM1	**with 1 x PDM1**	**with 2 x PDM1**	**without PDM1**	**with 1 x PDM1**	**without PDMX**[*]
PPP Routing Partner	70			70		70
vCAPI Clients IP Workpoint Clients capable of using vCAPI.	100			100		100
MOH Data Streams	10			10		10

[*] PDMX is currently not released.

9.4.2 Direct Media Connection

DMC (Direct Media Connection – Interworking with HiPath 4000 systems) allows improved voice quality between IP components (terminal devices, Gateways) within the HiPath 4000 network. DMC is only supported by the CorNet NQ/CorNet IP networking protocol.

DMC should be deactivated in a homogenous HiPath 3000/5000 network. Once a HiPath 4000 network (version 2.0 and later) has been configured with DMC, DMC should also be activated in the HiPath 3000/5000 systems.

HFA terminal devices (optiPoint/optiClient) registered to HiPath 3000 or HiPath 5000, and even a HiPath 3000 system itself, are then able to receive DMC connections set up by HiPath 4000 and its HFA terminals.

DMC is not used within HiPath 3000/5000 systems when active.

Activating DMC reduces DSP channel resources. In a HiPath3000 system, this means that only 80% of the channels per DSP are available for connections (e.g. 6 channels instead of 8, 12 instead of 16, 48 instead of 60).

9.4.3 Gateway Channels (DSP Channels)

Gateway connections are needed for connections to TDM workpoint clients and trunks, which require a gateway channel on the HG 1500 board. TDM workpoint clients and trunks include

- $U_{P0/E}$ stations (optiPoint 500)
- CMI stations
- Analog station
- ISDN station
- Trunks and tie-line trunks (HKZ, S_0, S_{2M})

Examples: A consultation hold is initiated with an optiPoint 500 telephone from an existing connection between two IP workpoint clients. A gateway channel from the HG 1500 board is needed for this consultation call.
An IP workpoint client seizes a trunk. A gateway channel from the HG 1500 board is needed for this trunk.

In the case of conferences, gateway channels are seized according to the number of participating stations and IP workpoint clients.

Required Channels for Gateway Connections

With the following table, you can calculate the number of gateway channels (HG 1500 boards) required from the existing number of IP workpoint clients.

These calculations are based on the following assumptions:

- A subscriber spends 10 % of his working time in the call state.
- The average time per call is 3 minutes.
- The availability loss is limited to 1.2 %.

A higher number of gateway channels (HG 1500-Linecard) must be taken into account in contexts with a higher volume of calls (e.g. call centers).

Table 9-17 Number of required gateway channels (HG 1500 boards)

IP workpoint clients in the system	Required number of gateway channels
0 – 3	2
4 – 12	4
13 – 16	6
17 – 38	8
39 – 54	10
55 – 70	12
71 – 86	14
87 – 96	15
97 – 101	16
102 – 136	20
137 – 172	24
173 – 210	28
211 – 247	32
248 – 324	40
325 – 402	48
403 – 481	56
482 – 562	64
563 – 726	80
727 – 890	96
891 – 1000	112

In a pure IP network, the number of gateway channels must be greater or equal to the number of TDM trunks.

The required number of HG 1500 boards for VoIP is the sum of the total number of gateway channels, MOH channels and conference channels.

9.4.4 ITSP Connection

HG 1500 supports Internet Telephony Service Provider (ITSP) connections and, as a result, the use of Internet telephony as of HiPath 3000/5000 V6.0 SMR-09, in particular DSL connections with DID capacity and a phone number range. A maximum of four active ITSPs are supported simultaneously.

Gateway channels are needed to connect to an ITSP. The following table shows the number of gateway channels (DSP channels) needed.

The maximum number of ITSP connections depends on the number of HG 1500 boards and PDM modules deployed and on the system used.

When using Internet telephony, the HG 1500 board may not be used as a router. Any ITSP connections must be set up over an external router.

Table 9-18 Number of gateway channels (DSP channels) required for basic call scenarios

calling station	receiving station
	ITSP Connection
TDM station (analog station, ISDN subscriber)	1
IP station (system client, H.323 client, SIP client)	2
ISDN trunk connection and CorNet-N/CorNet-NQ/QSig network	1
CorNet IP network	2
ITSP Connection	2

9.4.5 MOH Channels (G.711, G.723, G.729)

Pro Codec, which is used for MOH, is reserved a DSP channel on a HG 1500 board. A maximum of 5 codecs per HG 1500 board can be configured for MOH.

Examples:

- Only the G.711 codec is used for MOH: –> 1 DSP channel needed.
- The G.711, G.723.1, G.729AB codecs are used for MOH: –> 3 DSP channels needed.

The DSP channels used for MOH are no longer available for voice connections.

A limit of 10 IP workpoint clients per HG 1500 board can be provided with MOH at the same time, regardless of the number of codecs configured. This means that there can be a maximum of 10 MOH data streams per HG 1500 board. If you need more than 10 MOH data streams simultaneously, you must activate MOH on additional HG 1500 boards.

The B channels (DSP channels) used for MOH are license-free.

9.4.6 IP Networking Channels (PBX Networking Channels)

IP networking channels are used to connect between communications systems. A difference is made between connections requiring a gateway channel and direct payload connections. Depending on the type of connection, the following resources are required for successful connection setup.

Type of connection	Trunk	Gateway channel
direct payload connection	required	not required
gateway connection	required	required

If one of the required resources is unavailable, the connection request will be rejected.

The HiPath 3000/5000 Manager E determines how many of the maximum number of trunks available should be set up as IP networking channels (IP networking trunks). The maximum number of IP networking trunks permitted by the system can be found in Table 9-15.

9.4.7 Bandwidth Control for IP Networking Channels (PBX Networking Channels)

If IP networking channels are routed over the PPP channels (ISDN routing) of an HG1500 board, there is only bandwidth control when the router is on an HG1500 gatekeeper (signaling gateway).

If the router is on an HG1500 gateway (media gateways), there will be no bandwidth control.

9.4.8 DMC (Direct Media Connection) Channels

When the DMC feature is enabled in an IP network between HiPath 3000 and HiPath 4000, gateway connections are carried out over so-called DMC channels. From the user’s point of view, a DMC channel is a gateway channel that allows for a gateway connection between HiPath 3000 and HiPath 4000. Since a DMC channel must operate both a master and slave connection, there is a reduction in the number of DSP channels.

Note: The number of available gateway channels (DSP channels) is reduced as soon as the DMC interworking feature is enabled via HiPath 3000/5000 Manager E. In this case, a Digital Signal Processor (DSP) can only allocate 80 % of the total number of available channels (e.g. 6 instead of 8 DSP channels, 12 instead of 16 DSP channels, etc.).

9.4.9 ISDN Routing / PPP Channels

HG 1500 boards can also be used as ISDN routers. ISDN routers connect to physically separate IP networks over an ISDN trunk. The required bandwidth can be adjusted with channel bundling.

The system reserves the B channels necessary for ISDN routing and thereby limits the number of available gateway channels.

Table 9-19 HG 1500 – Total number of PPP channels and gateway channels (maximum numbers) by board

	HXGM3			**HXGS3** **HXGR3**		**STMI2**
	without PDM1	**with 1 x PDM1**	**with 2 x PDM1**	**without PDM1**	**with 1 x PDM1**	**without PDMX***
Sum of PPP channels (for ISDN routing) and gateway channels	16	24	32	8	16	32

* PDMX is currently not released.

If a large number of IP workpoint clients is required, the HG 1500 board may not also be used as an ISDN router. In this case, the ISDN routing functionality must be assigned to a separate HG 1500 board.

9.4.10 Fax/Modem Channels

Faxes can be sent over transparent G.711 gateway channels and with HiPath 3000/5000 from V7 R4 or later over T.38 channels (only fax).

T.38 offers the more secure fax transfer method but can only be used at a maximum rate of 14 kbps. Due to the higher processing capacity required for T.38, the number of T.38 channels is limited. Alternatively G.711 gateway channels can be used for fax transmissions (not for DSL telephony).

Because of technical restrictions for Internet telephony, modem transfers are not possible.

Note: The number of available G.711 gateway channels is reduced as soon as the DMC interworking feature is enabled in HiPath 3000/5000 Manager E.

Fax transmissions over the Internet with G.711 are frequently interrupted or produce errors. For this reason fax transmission via DSL telephony and G.711 is not supported. If the provider does not support the T.38 protocol, then T.38 must be activated on the gateway. Otherwise the ISDN must be used for the transmission. The number of potential fax connections at the same time depends on the hardware used.

Use the WBM to switch from G.711 to T.38.

9.4.11 Dynamic Configuration Rules

9.4.11.1 Empirical Formula for Dimensioning

The current dynamic rules may be found on the intranet at:
http://intranet.mch4.siemens.de/syseng/perfeng/tools/hptindex.htm.

9.5 Static and Adaptive Jitter Buffer

The HG 1500 jitter buffer can be configured for the connection requirements of a specific network.

Relevant WBM functions:

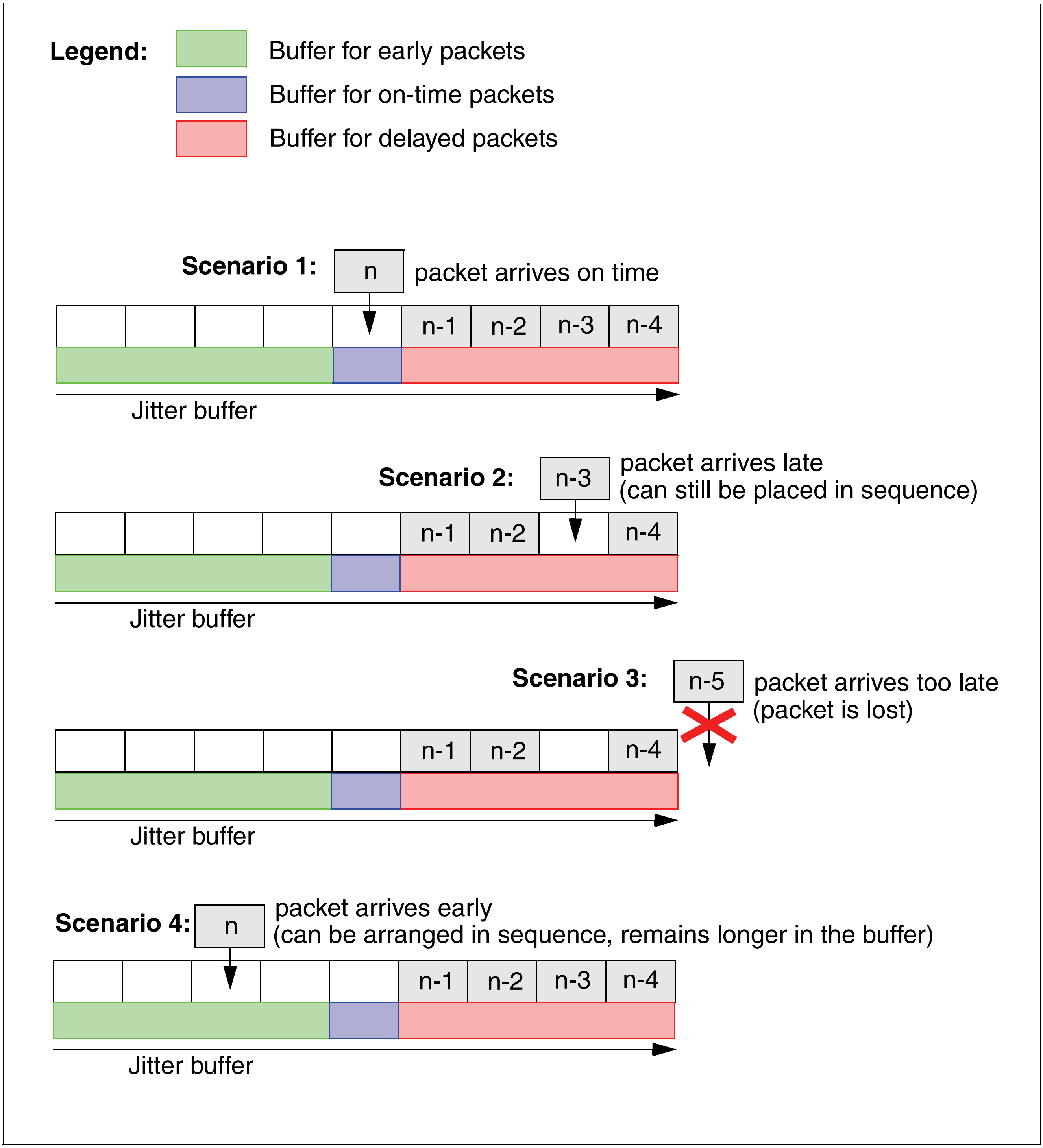
See Section 7.1.7, "Quality of Service"
See Section 7.7.5.5, "Editing DSP jitter settings"

9.5.1 Jitter Buffer Function

In TCP/IP-based networks, packets forming part of a single transmission can be sent at different speeds. As this property can have a negative impact, especially on voice signal transmissions, data stream manipulation is required. The jitter buffer is a cache memory for IP packets. It can counter-balance IP packet delays to a certain degree.

IP packets are stored in the jitter buffer in the sequence of arrival. Each packet bears a timestamp saved in the packet’s RTP header. These timestamps are used to determine the correct sequence. The jitter buffer ensures that the packets exit in the correct sequence and in real time. The average time (average delay) defines how long packets that arrive at the anticipated time remain in the jitter buffer. Packets that arrive later than anticipated remain in the jitter buffer for a correspondingly shorter length of time; packets that arrive sooner than anticipated remain longer in the jitter buffer. If a packet arrives too late to be placed in the correct sequence, it is lost. Theoretically, packets can also arrive too early to be placed in the correct sequence. This rarely happens, however, in practice.

The following illustration shows how the jitter buffer works:



Individual packet loss is acceptable in voice transmissions. However, the delay should be as low as possible as excessive delays negatively impact calls.

In the case of data transmission, packet loss should be as low as possible to guarantee data integrity. Delays, however, do not play a significant role.

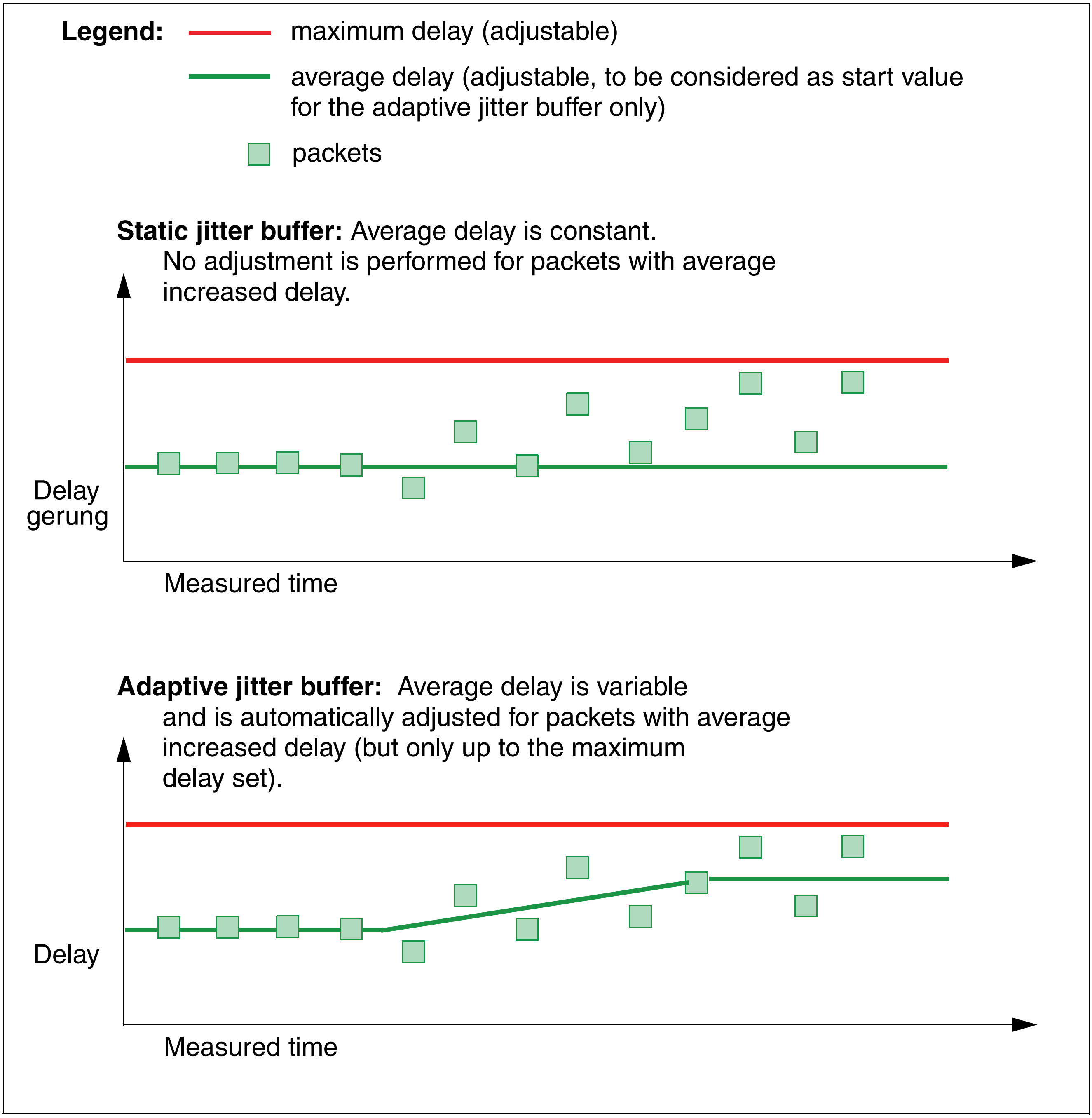
9.5.2 How the Jitter Buffer Works

The jitter buffer supports three different modes. Two of these are suitable for voice transmission and one is for data transmission (for example, transparent fax, transparent modem or ISDN data):

- **static** jitter buffer for voice
- **static** jitter buffer for data
- **adaptive** (dynamic) jitter buffer for voice

The adaptive jitter buffer is specially designed for voice transmission. While the average packet delay remains constant for the static jitter buffer, it is automatically adapted depending on the situation in the case of the adaptive jitter buffer.

The following illustration shows the difference between static and adaptive jitter buffers in a situation with increased packet delays:



Legend:

🟥 maximum delay (adjustable)

🟩 average delay (adjustable, to be considered as start value for the adaptive jitter buffer only)

🟩 packets

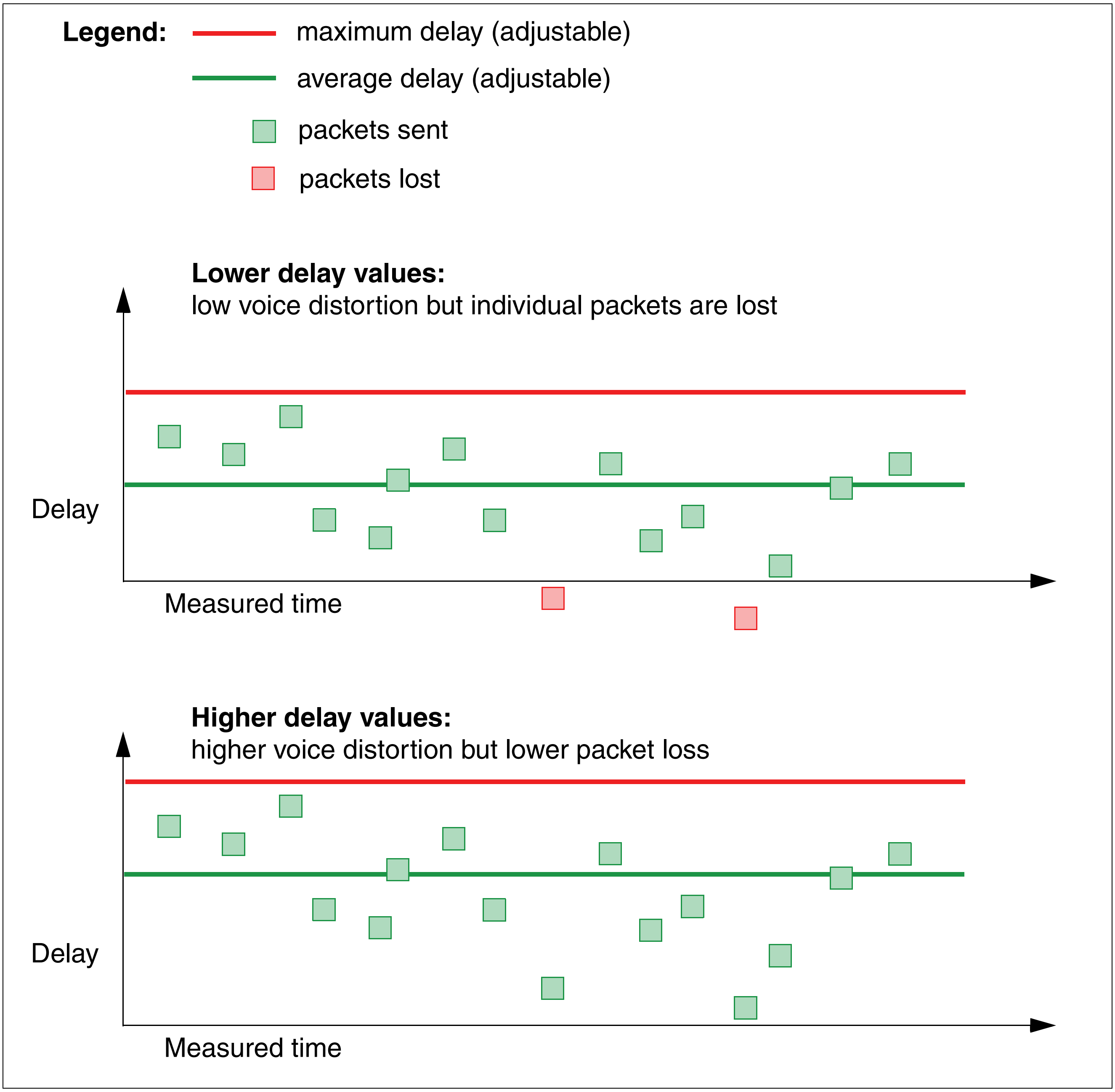
Static jitter buffer: Average delay is constant. No adjustment is performed for packets with average increased delay.

Adaptive jitter buffer: Average delay is variable and is automatically adjusted for packets with average increased delay (but only up to the maximum delay set).

The adjustable average delay (green line) is only the start value for the adaptive jitter buffer.

9.5.3 Considerations when Setting the Delay for Static Jitter Buffers

The lower the settings for average and maximum delay values, the lower the distortion factor, especially for voice transmissions. However, these settings increase the risk of packet loss. When the delay values are set higher, fewer packets are lost but the distortion factor increases. The following illustration shows this relationship:

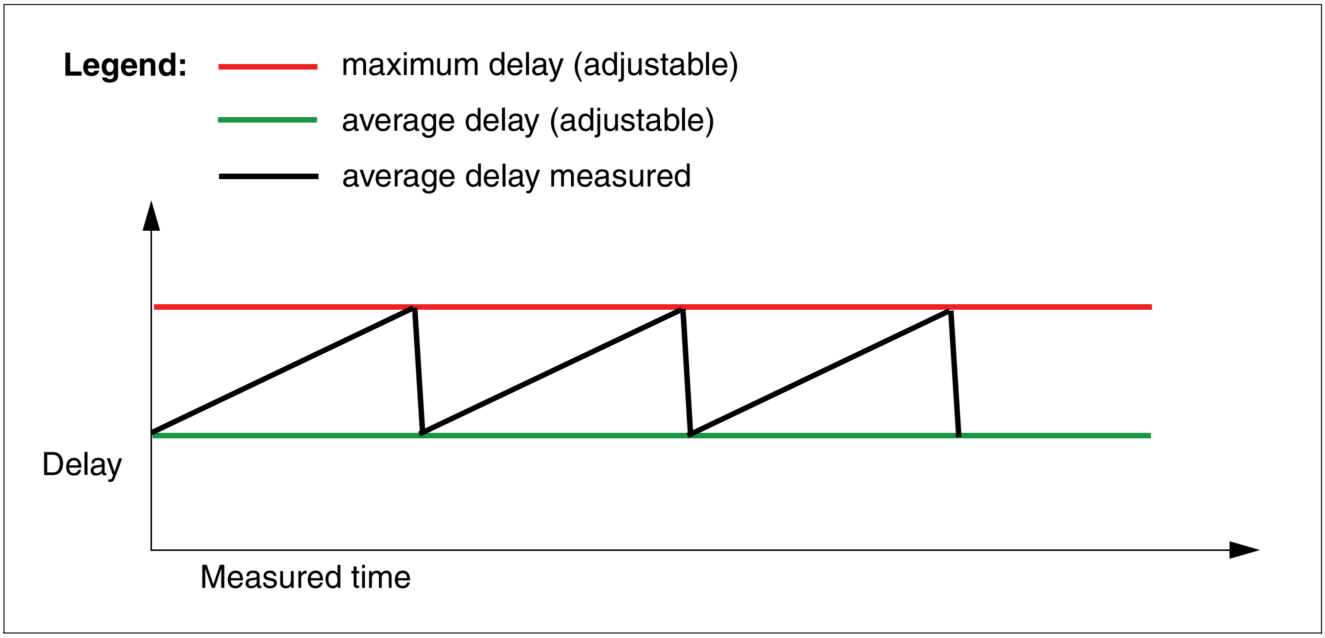

Legend:
maximum delay (adjustable)
average delay (adjustable)
🟩 packets sent
🟥 packets lost
Lower delay values:
low voice distortion but individual packets are lost
Delay
Measured time
Higher delay values:
higher voice distortion but lower packet loss
Delay
Measured time

The HG board is set by default to average values that have been proven in most environments.

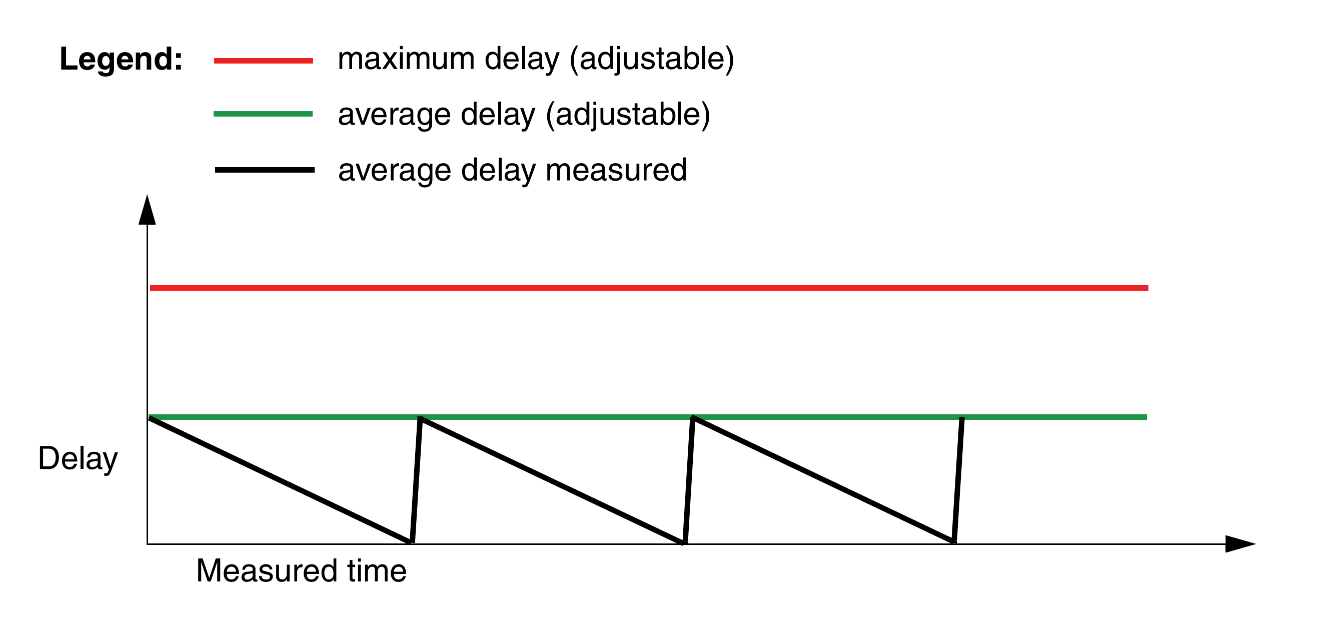
9.5.4 Clock Drift in Static Jitter Buffers

The measured time provides the timestamp for the packets that make up an IP-based voice transmission. If the time measurements on the send and receive side do not exactly match, more or fewer packets are generated on the send side than anticipated on the receive side. This discrepancy is known as clock drift.

If more packets are generated on the receive side than anticipated in the HG board's jitter buffer, more packets than expected flow into the jitter buffer. This causes a steady increase in the measured average delay. The jitter buffer readjusts when the maximum delay value is reached. It skips supernumerary packets until the measured average delay reaches the value set for average delay. Then the entire procedure starts again from the beginning. The following illustration shows this process:

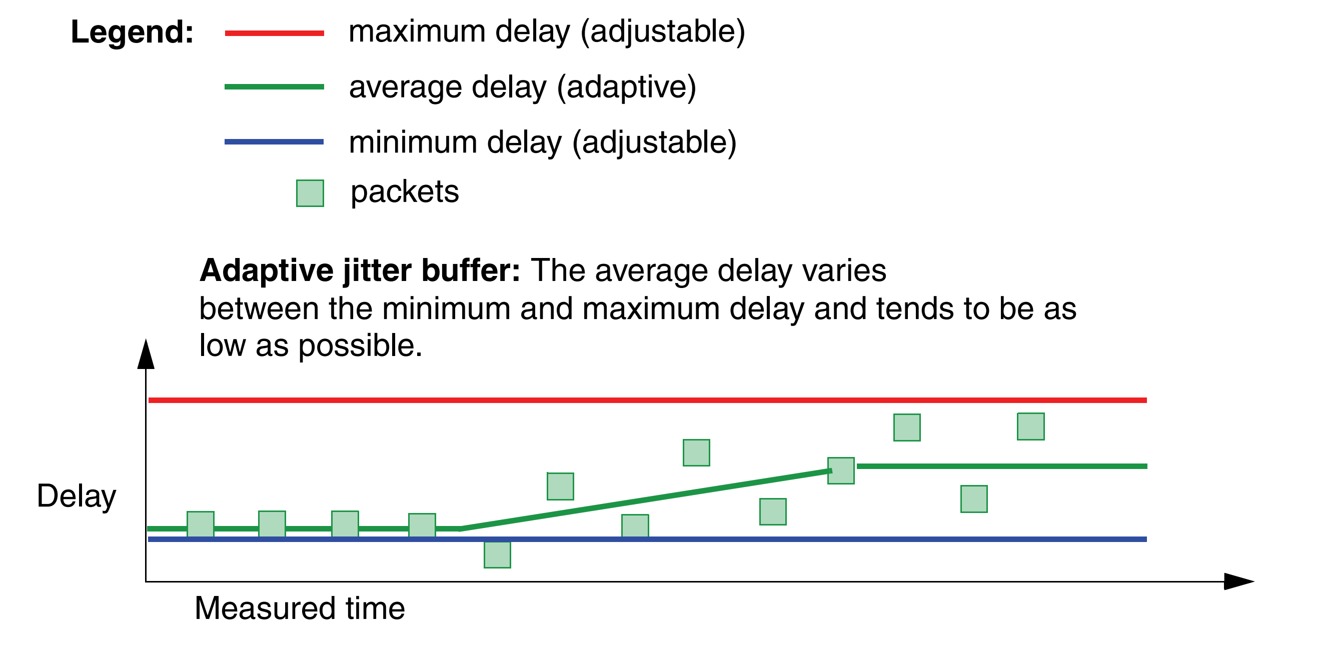


If fewer packets are generated on the receive side than anticipated in the HG board's jitter buffer, fewer packets than expected flow into the jitter buffer. This causes a steady decrease in the measured average delay. When there are no more packets in the jitter buffer, the jitter buffer readjusts and adapts the measured average delay once again to the value set for average delay. Then the entire procedure starts again from the beginning. In this case, no packets are lost. The following illustration shows this process:



9.5.5 Minimum Delay in Adaptive Jitter Buffers

In adaptive operating mode, the jitter buffer tries to keep the average delay as low as possible. In a situation where no jitter occurs, the average delay falls to a minimum. This minimum can be set on the HG board. The average delay that is adjusted on the basis of the current measured delay therefore fluctuates between two limits: the minimum delay set and the maximum delay set. The following illustration shows this:


Legend:
maximum delay (adjustable)
average delay (adaptive)
minimum delay (adjustable)
packets
Adaptive jitter buffer: The average delay varies between the minimum and maximum delay and tends to be as low as possible.
Delay
Measured time

The minimum and maximum delay limits are even maintained in the event of packet loss.

9.5.6 Packet Loss Verification in Adaptive Jitter Buffers

To avoid excessive packet loss, two factors are considered when calculating the average delay for adaptive jitter buffers:
1. the current delay measured
2. the number of packets lost

The weighting of the second factor can be set using a "preference" parameter in the HG board. Using values between 0 and 8, you can set whether more emphasis should be placed on minimizing the delay or preventing packet loss when calculating the average delay. Here, 0 means "avoid packet loss as far as possible" and 8 means "keep average delay as low as possible". The average value (4) is set by default.

The following rule of thumb applies: the value 0 produces an average delay that is approximately 10 ms longer that the average value 4 and the value 8 produces an average delay that is approximately 10 ms shorter than the average delay 4.

9.6 SSL and VPN

SSL is used for secure transmission of data between the Web browser on the administration PC and the HG 1500 Web server.

SSL supports the following security services:

- Authenticity (the communication partner is who he says he is),
- Trustworthiness (the data cannot be accessed by a third party)
- Integrity (the data was received in the same condition as it was sent).

These security services demand prior agreement on the security mechanism used and the exchange of cryptographic keys. These two tasks are performed in the course of connection setup. The server transfers an SSL certificate with its public key to the client. Client authentication is optional, and not used in the HiPath 3000/5000 V8 - HG 1500 V8. SSL uses the public key procedure. A master key is generated at the client for the relevant SSL connection. This is transported to the server under the protection of the server’s public key. Using deterministic principles (that is, without any further secrecy), the two sides then take this master key and create a client-session key or a server-session key. The server-session key is used for the path from the server to the client and the client-session key is for the opposite direction.

VPN functions are also used for secure payload transmission with guaranteed authenticity, trustworthiness, and integrity. In contrast to SSL where only TCP data streams are secured, a VPN that uses IPsec can secure all data that is transmitted in IP packets, such as TCP, UDP or ICMP data.

SSL uses **certificates and keys** to guarantee secure data transmission. VPN on the other hand only uses certificates and keys when there are no pre-shared keys in use. For VPN connections, **tunnels** are used between the communication partners who conduct calls or exchange data over an IP connection. Connections of this kind are configured using various **services** and **rules**.

9.6.1 Encryption and Keys

> You must obtain and install the correct licenses to implement VPN functions on the HG 1500 board (see Section 7.1.3, "License Management").
> You do not need licenses to use SSL.

Keys can have the following functions:

- Ensure that data is not changed or manipulated in the course of transmission,
- Make data indecipherable on the outside.

A basic distinction is made between symmetric and asymmetric encryption. Symmetric encryption requires only one key which is used both for encryption and decryption. Both the sender and recipient of a data transmission encrypted in this way require this key. Asymmetric encryption uses **public keys** and **private keys**. The recipient uses the public key for encryption and the private key for decryption. In this way, the sender and recipient only have to exchange public keys. They both use their private keys for decryption.

An advantage of asymmetric encryption is that the sender and recipient do not have to share secrets (the single key). Instead, they must trust each other with the public key. **Certificates** regulate the trustworthiness of public keys.

In practice, symmetric and asymmetric encryption are frequently used together as asymmetric encryption requires enormous computing power. In mixed mode, a time-restricted key (also known as a **session key**) encrypts and decrypts the data using symmetric encryption. Only the session key is exchanged using asymmetric encryption.

Additional security is provided by digital **signatures**. These are required because data encryption only ensures that tapping attempts yield nothing but meaningless data trash. Signatures are used to ensure that the data was actually dispatched by the sender specified. The signature is a comparatively short but unique character string. It fulfills the function of a personal signature.

A signature is created in two stages. In the first stage, a type of checksum is created using the data you want to transfer. Special algorithms known as **hash algorithms** generate these checksums. These algorithms let you generate a fixed-length byte string from a random-length byte string. The hash algorithms generates a completely new checksum if so much as one bit changes in the data. The checksum is encrypted with the sender’s private key and, following decryption with the sender’s public key, can be checked by anyone. It is therefore easy to establish who sent the data.

Keys and checksum are generated using encryption routines (encryption algorithms). The following procedures are important in connection with HG 1500:

- **DES**
  DES stands for Data Encryption Standard. DES is designed for symmetric encryption. The public key length is 64 bits (8 characters).
- **3DES**
  3DES is derived from DES and stands for triple encryption. The public key length is 192 bits (24 characters).
- **AES**
  AES stands for Advanced Encryption Standard. AES is also designed for symmetric encryption. The public key length is 128 bits (16 characters).
- **RSA**
  RSA stands for Rivest Shamir Algorithm. RSA is an algorithm for asymmetric encryption.
- **DSA**
  DSA stands for Digital Signature Algorithm. While the RSA procedure is suitable both for signatures and key exchange, DSA is only suitable for signatures.
- **MD5**
  MD stands for Message Digest and 5 indicates a later variant of the MD algorithm. MD5 is a straightforward hash algorithm and generates a unique, 128-bit (16-character) comprehensive checksum from random data lengths.
- **SHA1**
  SHA stands for Security Hash Algorithm, 1 indicates a later version of this algorithm. SHA1 is a hash algorithm and generates a 160-bit (10-character) checksum from data lengths under 264 bits.

9.6.2 Certificates

Certificates guarantee the authenticity of public keys by linking the public key to the identity of the owner.

A certificate contains the following typical information:

- the name of the owner,
- the public key of the owner,
- a signature from a certification authority for the name and key,
- information on the hash algorithms with which the public keys can be used,

- start and end of certificate validity,
- a serial number,
- the name of the certification authority.

Before data is transferred in secure mode, the certificates of the data sender and recipient are exchanged and checked. If necessary, session keys are now negotiated. Only then is the user data transferred.

People who send data can generate their own certificates (self-signed). If these do not offer a sufficient level of trustworthiness, certificates that were generated (signed) by an independent, well-known and trustworthy authority can be used. Certification authorities (CAs) are created for this purpose. Examples of public CAs include universities, publishing companies, and authorities.

CA hierarchies can be formed. In this way, CA certificates may be generated by superior CAs. The certificate generated by a university may have been generated, for example, by a state certification authority.

An environment in which certificates and their owners are centrally managed is known as a **Public Key Infrastructure (PKI)**. Certificates are issued by CAs. You can create a PKI in HG 1500 to facilitate certificate management. You can use the PKI to set up servers for the central storage of the certificates and certificate revocation lists configured in the VPN.

Different certificates are used for the SSL and VPN functions in HG 1500, depending on the task at hand. The certificates used and their descriptions are listed below.

- **CA Certificate**
  Certificate generated by a certification authority (CA). A CA certificate can be either self-signed or CA-signed. The CA is the highest trust center for a self-signed CA certificate. The CA is part of a CA hierarchy for a CA-signed CA certificate.
  In the HG 1500, the lightweight CA certificate and the SSL certificate generation are self-signed CA certificates. The lightweight CA of the HiPath 3000/5000 V8 - HG 1500 V8 is always a root certification authority (CA). Intermediate certification authority functions are not supported.
- **Self-Signed Certificates**
  The subject and issuer are identical in the case of a self-signed certificate. There is no higher trust center. CA certificates can also be self-signed.
- **CA-signed certificates**
  Unlike self-signed certificates, these certificates have been signed by a CA. CA certificates can also be CA-signed (CA hierarchy).
- **Trusted CA Certificates or Trusted Certificates**
  If a CA is classified as trustworthy by a user after the CA certificate has been imported, it becomes a trusted CA for that user. For VPN authentication, the HiPath 3000/5000 V8 -

HG 1500 V8 only accepts peer certificates that have been issued by a trusted CA. In HG 1500, only CA certificates are accepted in the "Trusted CA Certificates" folder. In Internet Explorer, however, both self-signed and CA-signed peer and CA certificates can be imported as trusted certificates.

- **Server Certificate**
  A server certificate is used for data exchange for a typical client/server communication, for example between a browser and Web server. With this certificate the server identifies itself to its clients and provides them with its public key. This is also often referred to as "User Certificate". A server certificate can be self-signed or CA-signed.
- **Peer Certificate or VPN Peer Certificate**
  In the context of IPsec, a server certificate is usually referred to as "Peer Certificate" or "VPN Peer Certificate". The reason for this is that when using IPsec both communication peers have a certificate and there is no client or server assignment when communicating via an IPsec tunnel. A peer certificate is always CA-signed.
- **Root Certificate**
  A root certificate is the highest certificate in a PKI. A root certificate is always a self-signed CA certificate.

9.6.3 IPsec Tunnel

IPsec (IP Security) is an Internet standard for setting up secure IP connections between two terminal devices (peer-to-peer communication). An IPsec tunnel is set up for this between the IP addresses of the connection. IPsec tunnels are used for VPNs. An IPsec tunnel consists of the following security functions:

- **Packet Encryption**
  All IP packets can be transferred in encrypted format. Encryption routines (encryption algorithms) are used for this. There are two types of packet encryption: transport mode and tunnel mode. In transport mode, only user data is encrypted while tunnel mode encrypts both user data and IP header data.
- **Packet Integrity**
  IPsec ensures that all IP packets are intact (that is they have not been manipulated) when they reach the recipient. Hash algorithms such as MD5 or SHA are used for this. A completely new byte string is created every time a bit is manipulated in the data package after using the hash algorithm with the result that even bit-level manipulations are reliably detected.
- **Packet Authenticity**
  IP packets are considered "authentic" if the sender’s and recipient’s IP address could not be manipulated during data transmission. In other words, packet authenticity guarantees that the data comes from the recipient you specified. Hash algorithms are also used for this.

- **Key Administration**
  The IKEservice is always used for key administration. Key administration covers the type of encryption, the key used, and the length of validity. All of these parameters are written in the **Security Association (SA)**.

VPN connections with HiPath HG 1500

HG 1500 supports up to 256 tunnels per board.

VPN connections with HiPath HG 1500 always require three SAs:

- One for the initial mutual authentication and for exchanging the session keys (IKE-SA)
- One for each direction of the actual connection for payload traffic once established (payload SAs)

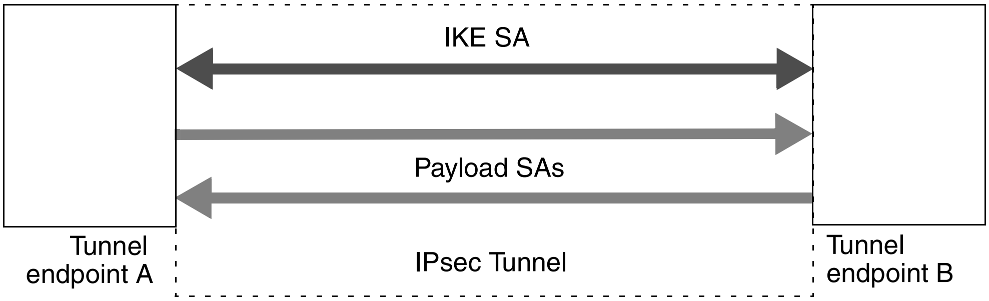


Figure 9-1 Security Association of a VPN tunnel

Tunnels must always be configured in both VPN peer devices.

The HG 1500 uses IPsec tunnel mode with ESP (Encapsulating Security Payload). ESP is an IPSec protocol used to guarantee packet encryption, packet integrity and packet authenticity. The integrity and authentication check does not extend to the IP header. It is only performed for the actual data (payload).

The IPsec protocol AH (Authentication Header) is not used by HG 1500. AH guarantees packet authenticity and integrity of the entire IP packet, including the header. In particular, the AH mechanism cannot be used in conjunction with NAT (Network Address Translation) because this procedure changes the IP header.

9.6.4 Services

Services may optionally be defined for the rules set out in the following section. You can use the rules to define how a specific service should treat IP packets ("pass", "deny", encryption). You can define services via the fields Source Port, Destination Port and IP Protocol.

For example, you can define the HTTP service as follows:

- Name: HTTP
- Source Port: 0 (Unknown or Any)
- Destination Port: 80
- IP Protocol: TCP

> The source and destination port 500 cannot be configured here. This port is used for the IKE (Internet Key Exchange) protocol. In conjunction with the IPSec protocol, the IKE protocol controls the automatic selection of the methods used for packet encryption and for packet integrity, as well as the lifetime of keys.
> A pre-defined, invisible default rule already exists for IKE in the IPSec stack on the HiPath 3000/5000 V8 - HG 1500 V8; this rule always passes IKE service packets. It is not necessary for the user to configure the IKE service because it is preconfigured by default.

9.6.5 Rules

Rules are the superior instrument for configuring concrete VPN connections on the basis of IPsec tunnels and services.

A rule specifies if IP packets are allowed (pass) or rejected (deny) on a gateway between specific fixed IP addresses or IP address ranges with VPN. Pass or deny are the possible **actions** of the rule in this case.

A rule with pass action also determines if data encryption is necessary and which IPsec tunnels and services are needed for this. IPsec tunnels and services therefore have to be set up before you create rules.

The IP packet’s transmission direction between the IP addresses or IP address ranges is also important (see also Figure 9-1). A rule is always defined for a particular transmission direction, and there is thus a distinction between **Source Address** and **Destination Address**. If a connection is initiated in this direction and permitted in accordance with the defined rule, then the return direction for this connection is automatically opened for a set period of time. The destination address can therefore respond to the source address, without the need for a rule. This is guaranteed using the "Stateful Inspection" function of the IPsec stack. Once a rule has been configured for one direction, a rule must always be defined for the return direction to facilitate the setup of connections in both directions (which can be initiated from both sides).

Every rule is also assigned a **priority**. A rule for a transmission direction and the matching rule for the opposite direction always have the same priority. Priorities are assigned in the form of random numbers. Higher numbers indicate a lower priority. In other words, a rule marked priority 1 is evaluated first because it has the highest priority.

A rule could, for example, define the following:
IPsec-tunneled data transmissions from the host with the IP address 192.168.1.50 (source address) to the host with the IP address 192.168.4.50 (destination address) should be allowed. The data must be encrypted. The IPsec tunnel named "Tunnel1" should be used at the source address, and the IPsec tunnel named "Tunnel2" should be used at the destination address. The rule should have priority 2.

Multiple rules therefore contain multiple conditions. The rules are processed according to priority. Consequently, the condition of the rule with the highest priority is checked first and the one with the lowest priority is checked last. The system browses this processing sequence and implements the first rule found that matches a concrete connection request. Lower-priority rules that also match are not applied. In practice this means:

- General rules should have a lower priority than restrictive rules. Otherwise, the general rules would eclipse the restrictive rules because processing ends when the first matching rule is found.
- Undefined or general rules should have a lower priority than defined rules. An undefined rule defines entire subnets or the address 0.0.0.0 (=unknown) as the source or destination. An undefined rule with a higher priority "eclipses" a defined rule with lower priority because processing ends when the first matching rule is found.

9.6.6 Authentication

SSL Authentication

Client/server communication in SSL-based WBM administration.

The client, i.e. the browser which you used to start the WBM, uses a user account (user name and password) for server authentication. This must have already been created.

The server uses the certificates generated or imported by the SSL function for authentication at the client. Such certificates can be imported into the browser as trusted certificates to avoid warning messages in the browser when connecting to the SSL server (HiPath 3000/5000 V8 - HG 1500 V8).

VPN Authentication

Peer-to-peer communication in VPN. The following two types of authentication are possible for VPN peers:

- **Pre-shared keys**
  Authentication by the opposite tunnel endpoint is performed using a "pre-shared key". This is a key you select when configuring a tunnel. In order for VPN peers communicating via the tunnel to authenticate themselves, the same password must be used for both tunnel endpoints.
- **Digital signatures**
  Every VPN peer is assigned a certificate. For successful authentication, the VPN peers at both tunnel endpoints must check the digital signature of their peer against a trusted CA.

9.6.7 SSL and VPN in HG 1500

SSL is designed for secure administration, while VPN is used for secure user data transmission. The following security levels are available:

- **Factory Default**
  This is the initial setting on delivery. The HXG3 board contains no configuration data. The board can be configured using Telnet (CLI), V.24 (CLI), and HTTP (WBM).
- **Insecure Mode**
  This is the standard operating mode without SSL and VPN. The board is configured for insecure user data traffic. All IP protocols are open and the board can be administered using Telnet (CLI), V.24 (CLI), and HTTP (WBM) in insecure mode (unencrypted). The board does not contain any security data.
- **SSL Enabled**
  This is the status after the CLI command **`reset secure`**. In this mode, the board can only be accessed and administered using V.24 (CLI). Additional services that can be accessed using IP are closed down. Only commands for configuring the SSL function are possible. Other data traffic is blocked. All data administered before SSL is enabled are deleted by this action.
- **Secure Administration**
  This is the status after the first server certificate has been generated and the SSL function has been enabled using the CLI command **`enable ssl`**. The board can now be administered using V.24 (CLI) and HTTPS (WBM). Insecure access options (such as Telnet) and protocols (such as FTP, TFTP) are blocked. An IPsec policy can be set up or edited but is not, however, enabled in this mode. Insecure user data traffic is therefore possible.
- **Secure Mode**
  This is the status after the IPsec policy has been set up and enabled. The board is in the same mode as secure administration. In addition, secure data traffic is activated in accordance with the security policy configured.

> If you switch a HG 1500 from insecure mode to secure mode with **`reset secure`**, then you have to reset the data manually.

9.7 H.235 Security

The H.235 protocol enhances the capabilities of H.323 and other protocols to include security functions for authentication, data protection, and data integrity. H.235 supports various encryption algorithms and adjustable options, such as, key length.

HG 1500 supports the H.235 protocol. The basic settings, however, are not included in the gateway's configuration scope but are rather included in HiPath 3000 Manager E.

9.8 Using SNMP

The HiPath 3000/5000 V8 - HG 1500 V8 offers SNMP support.

Relevant WBM functions:

See Section 6.8, "SNMP"
See Section 7.8.4, "SNMP Statistics"

An MIB browser (available with Hewlett-Packard's "Network Node Managers") is required for using SNMP functionality.

Prerequisites for SNMP configuration:
The SNMP community name read access cannot be changed. Otherwise, there would be no synchronization with HiPath 5000 RSM and applications such as the software or inventory manager.
If the SNMP community name for read access was changed inadvertently, the software manager cannot read the MIB items in HiPath 3000 and DES HG 1500.

9.8.1 SNMP traps

Trap
COLD START
WARM START
INTERFACE UP
INTERFACE DOWN
AUTHENTICATION ERROR (incorrect SNMP community name)

Table 9-20 Generic SNMP Traps (MIB-2)

The following HG 1500-specific trap classes are available:

- General traps
- Reboot traps
- Threshold/statistic, resource/diagnostic traps,
- Security traps
- License traps
- Traps for internal errors

The following tables list the individual traps for each of these classes. A distinction is made under "Type" between hardware traps (HW) and software traps (SW).

Type (SW/HW)	**Trap Message**	**Explanation**
SW	MSG_GW_SUCCESSFULLY_STARTED	Gateway successfully started

Table 9-21 General Traps (HG 1500-Specific)

Type (SW/HW)	**Trap Message**	**Explanation**
SW	MSG_CAT_H323_REBOOT	Reboot with H.323
SW	MSG_CAT_HSA_REBOOT	Reboot with HSA
SW	MSG_ADMIN_REBOOT	Reboot with WBM/CLI-Admin, software upgrade or data restore
SW	MSG_SYSTEM_REBOOT	Automatic reboot, for example with Garbage Collection
SW	MSG_EXCEPTION_REBOOT	Reboot with SW exception
SW	ASSERTION_FAILED_EVENT	Reboot following declared exception
SW	EXIT_REBOOT_EVENT	Reboot following exception on termination
HW	MSG_DSP_REBOOT	Reboot following DSP error
HW	MSG_DELIC_ERROR	Reboot following DELIC error

Table 9-22 Reboot Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
HW	MSG_IP_LINK2_FAILURE	IP-Link 1 up/down
HW	MSG_IP_LINK2_FAILURE	IP Link 2 up/down
HW	MSG_OAM_HIGH_TEMPERATURE_EXCEPTION	Temperature limit reached (too hot)
SW	MSG_GW_OBJ_MEMORY_EXHAUSTED	Out of memory
SW	MSG_GW_OBJ_ALLOC_FAILED	Out of memory (signaled by external source)
SW	MSG_GW_OBJ_MEMORY_INCONSISTENT	Memory inconsistency
SW	MSG_TLS_POOL_SIZE_EXCEEDED	No more internal pools
SW	MSG_OAM_RAM_THRESHOLD_REACHED	RAM limit reached
SW	MSG_OAM_DMA_RAM_THRESHOLD_REACHED	DRAM limit reached
SW	MSG_OAM_THRESHOLD_REACHED	Limit reached, for example, for flash memory or IP pools
SW	MSG_DVMGR_LAYER2_SERVICE_TRAP	B channel up/down

Table 9-23 Threshold/Statistic, Resource/Diagnostic Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
SW	MSG_HACKER_ON_SNMP_PORT_TRAP	Unauthorized access to SNMP port

Table 9-24 Security Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
SW	MSG_LIC_DATA_ACCEPTED	License data accepted
SW	MSG_LIC_DATA_CORRUPTED	License data incomplete
SW	MSG_LIC_DATA_NOT_ACCEPTED	License data not accepted

Table 9-25 License Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message
SW	MSG_WEBSERVER_MAJOR_ERROR
SW	MSG_SSM_NUM_OF_CALL_LEGS_2BIG
SW	MSG_SSM_SESSION_CREATION_FAILED
SW	MSG_IPNCV_STARTUP_ERROR
SW	MSG_IPNCV_STARTUP_SHUTDOWN
SW	MSG_IPNCV_INTERNAL_ERROR
SW	MSG_IPNCV_MEMORY_ERROR
SW	MSG_IPNCV_SIGNALING_ERROR

Table 9-26 Traps for Internal Errors (HG 1500-Specific)

The weighting of the individual traps can vary depending on the severity of the event or error and is described by the following categories:

- Cleared (problem already resolved)
- Indeterminate (no classification possible)
- Critical (critical error)
- Major (major error)
- Minor (minor error)
- Warning (warning only)
- Information (for information only)

General traps, such as MSG_GW_SUCCESSFULLY_STARTED, are sent as "information".

Reboot traps are always "critical", "major" or "minor" errors.

Threshold/resource traps occur as follows: When an event is received, the trap is sent as either "Warning", "Minor" or "Major". If the trap recurs, reminders are sent (at increasing intervals) with a weighting that is at least the same or higher than the initial trap. If the event was corrected (for example, "Link up" or sufficient RAM was provided), the trap is sent with the category "Cleared".

9.8.2 SNMP Functions

The SNMP functions include:

- With MIB browser and standard MIB (based on RFC1213):
  - querying and modifying standard MIB 2 parameters
- With MIB browser and private MIB:
  - querying and modifying HG 1500’s private MIB parameters
- With HiPath 3000 Manager E:
  - defining communities of standard parameters (classes of service)
  - defining trap communities and stations to which the traps are sent
  - defining the trap level for various trap groups (error sensitivity)
- With trap receiver:
  - receiving traps

MIBs also contain a brief commentary explaining the meaning of each parameter.

The following is a list of some parameters:

- mgmt > mib-2 > system > sysUpTime: time since the last HG 1500 startup
- HLB2MIB > siemensUnits > pn > hlb2mib > controlGrouphlb20 > sysSoftwareVersion: board software release
- mgmt->mib-2->ip->ipRouteTable: HG 1500 routing table

HG 1500 sends SNMP traps (diagnostic and error messages) to the stations configured under "SNMP > Trap Communities". These messages are transmitted in accordance with the severity levels set under "SNMP".

Examples of traps generated by HG 1500:

1. Generic traps (cannot be deactivated):
   - warm start
   - cold start
   - authentication failure
2. Enterprise traps (can be configured)
   - data init (WARNING - forced data reinitialization)
   - memory low (WARNING - memory resources below the threshold)

- duplicate mac (MINOR - duplicated MAC address)
- ip firewall (WARNING - IP firewall violation)
- mac firewall (WARNING - MAC firewall violation)
- isdn access (WARNING - ISDN access verification)

SNMP information can also be sent as e-mail to a mail address configured with the WBM.

9.9 Fault Detection with Traps, Traces, and Events

Board errors can be detected and traced with the following options:

- **Traps**
  indicate irregular states, critical errors or important system information.
- **Traces**
  log the execution of a software component.
- **Events**
  report system problems or system information.

Traces and events are written to their own event log files.

Relevant WBM functions:

See Section 6.8.2, "Traps"
See Section 6.6, "Traces"
See Section 6.7, "Events"

References to trace components, trace profiles, and events:

See Section B.1, "Traces"
See Section B.2, "Events"

9.9.1 Traps

When board problems occur, traps are generated to inform the administrator of errors. The following types of trap are available:

- System Traps
- Performance Traps

WBM displays traps dynamically. The list of traps is refreshed every 30 seconds. You can also manually refresh the display.

System Traps

These traps:

- indicate system errors and require the administrator to take countermeasures,
- or they signal important system information.

Trap	Recommended action
Board started successfully	Information only, no action required
Reboot initiated by administrator, garbage collection, VxWorks, H.323 or H.323 Stack Adapter (HSA)	The reboot will be executed, no action required
Memory problems (memory full, memory allocation failed, memory is inconsistent)	Reboot will be executed automatically, no action required
Internal software problem (Check failed, "exit" event, problem with configuring pool size, session setup)	Reboot will be executed automatically, no action required
Flash memory capacity has been reached	Remove any unnecessary files from flash memory (this should only be done by a system specialist)
IP network stack resources are exhausted	Check the IP configuration of the gateway and routers
SCN connection error	Information only, no action required

Table 9-27 System Traps

Performance Traps

These traps indicate performance problems.

Trap	Recommended action
System memory is full	None
DMA memory is full	None
Temperature threshold on the board is exceeded	When using a ventilator kit: Check that the fan is in proper working order.

Table 9-28 Performance Traps

9.9.2 Traces

A trace logs the execution of a software component. A technician can use these process records to find the cause of an error.

Trace results can be:

- saved in a log file and/or
- saved on a PC via a LAN connection.

The following trace functions are available:

Trace function	Description
Trace format configuration	Define which header is contained in the trace and how the trace data is to be edited for the output format.
Trace output interfaces	Define the interface via which the trace data is to be output.
Trace Log	Loads trace results as a log file from the board to a destination computer via HTTP and enables trace data to be deleted from the board.
Customer trace log	The customer trace log of the HG 1500 can be displayed, loaded via HTTP onto the administration PC and deleted from the flash memory of the gateway.
Trace Profiles	Groups the monitoring of individual components into customized profiles. Profiles can be created, changed, started or deleted.
Trace Components	Monitoring can be started or enabled and disabled for each component individually. In addition, the data to be entered for each component can be specified.

Table 9-29 Trace Functions

The possible settings are described in Section 6.6, "Traces".

If the load is particularly heavy, the board may not be able to process all trace information. Please note the information at the end of Section 6.6.1, "Trace Format Configuration".

9.9.3 Events

Events notify you of system faults. Check the network configuration and/or gateway configuration to clear up any abnormalities.

Depending on the setting and the class of problem, events can generate an SNMP trap, send a message to the HiPath system, send an E-mail, initiate a trace observation and reboot the board.

Events are always written to a log file (see Section 9.9.4, "Event Log Files").

9.9.4 Event Log Files

All events are written to a log file of a limited size. When the maximum file size is exceeded, new messages overwrite the oldest entries.

The event log file name is:

```
evtlog.txt
```

It is saved in the HG 1500’s flash memory in the following directory:

```
\tffs\evtlog
```

The event log file can be transferred to a PC. Use the WBM maintenance function "Load via HTTP" for this.

The meanings of these entries are as follows:

Entry in Log File	Meaning
IFTABLE	Name of component that initiated the event
tH323-CLP	Name of task that initiated the event
03/17/2000	Date of event
08:13:56,828020	Time of event in hh:mm:ss (seconds with six places after decimal point)
ciftable01.cpp 433	Name of source file with line number where event occurred
csevWarning	Event class
MSG_DVMGR_INTERROR_DEVID	Internal event code
DeviceID(0XFFFFFFFF): CIIfTable:: fCheckConsistency Persistency files and hw_specification inconsistent!	Text in event file

Table 9-30 Meanings of Entries in Event Log Files

A Terms and Abbreviations

3DES
Triple DES. Improved version of the symmetrical DES encryption procedure in which the DES algorithm is applied three times to achieve a higher level of security.

A

AES
The Advanced Encryption Standard is the successor of the DES or 3DES encryption standard.

AF
Assured Forwarding. Procedure for controlling broadband for Quality of Service.

ARP
The Address Resolution Protocol is a protocol which maps level 3 IP addresses to level 2 hardware addresses (MAC addresses).

B

BBAE
Broadband connection unit. The BBAE is the physical port on the subscriber line for a connection line used for broadband. It splits the supplier network from the connection cable at the subscriber and processes the signals for transmission over the relevant connection segment. In the case of DSL connections, the BBAE usually also features a splitter that splits or combines the broadband and narrowband signals.

B channel
An ISDN user data channel ("bearer channel") with a capacity of 64 Kbps.

Bandwidth
The bandwidth of a communication channel is its capacity for transferring data.

Boot
This term refers to the startup procedure. The boot ROM contains the start code; "booting" is another word for "starting".

C

CA
Certification Authority. Trustworthy institution for issuing certificates.

CAPI

Common ISDN Application Interface. Important CAPI interface properties include support for multiple B channels for data and voice, use of the B channel protocol for connection control, selection of different services, support for multiple logical connections over a physical connection, support for multiple connections, use of multiple communication protocols and support for one or more basic accesses or primary rate accesses.

CHAP

Challenge Handshake Authentication Protocol. In the case of CHAP, authentication is controlled by the host. When a client dials in, he or she is prompted by the host to authenticate himself or herself. The username/password combination used for authentication is transmitted by the client in encrypted form via MD5.

CLI

Command Line Interface. Generic term for command lines and shells, terminal emulations, etc.

CLIR

Calling Line Identification Restriction. ISDN feature.

Codec

Codecs convert analog audio or video data into digital format (encoding) and back into analog format (decoding).

CorNet-NQ

CorNet NQ (from "Corporate Networking") is a Siemens proprietary signaling protocol. CorNet-NQ is a superset of CorNet N which supports QSIG.

D

D channel

A D channel is an ISDN signaling channel which transmits call control information.

DES

Data Encryption Standard. Conventional encryption and decryption procedure with symmetrical algorithm; in other words, the same key is used for encryption and decryption. The block size is 64 bits, that is, a 64-bit block of plaintext is transformed into a 64-bit block of ciphertext. The key that controls this transformation is also 64-bit. However, only 56 of these 64 bits are available for the user; the remaining 8 bits (one bit from each byte) are required for the parity check.

DID

Abbreviation of "Direct Inward Dialing". DID is a method of forwarding incoming calls directly to H.323 terminals.

DLS

The DLS (Deployment Service) is a HiPath management application for administering workpoints (optiPoint telephones and optiClient installations) in HiPath and non-HiPath networks.

DLI

DLI is the abbreviation for DLS interface.

DMA

Direct Memory Access. DMA technology allows peripheral devices, such as network cards or sound cards connected to PCs, to communicate directly with each other without a detour over the CPU. The advantage of DMA technology is increased data transmission speeds while at the same time unloading the processor.

DMC

Direct Media Connection. The DMC feature is used in HiPath for VoIP (Voice over IP) connections to support the "Payload Switching" feature.

The payload (voice channel) of a HiPath-internal or network-wide voice connection is transferred via a LAN; here a direct IP connection with no previous TDM data stream conversion may be made.
When the "DMC any-to-any“ feature is being used, the payload data in a HiPath network is transferred directly between the IP endpoints without repeated IP TDM conversion. This direct payload connection is known as Direct Media Connection

DNS

Domain Name System. The DNS is a database distributed over a number of Internet hosts and responsible for correct routing based on the domain name. DNS assigns domain names to IP addresses.

DSA

Digital Signature Algorithm, an encryption algorithm. DSA works with a variable public key length of between 512 bits and (maximum) 1024 bits.

DSL

Digital Subscriber Line. DSL technology speeds up data transmitted over conventional telephone lines significantly and is designed chiefly for fast Internet access. DSL connections are primarily available with the technologies Asymmetric DSL (ADSL) and Single Pair DSL (SDSL). The more common variant, ADSL, transmits Internet data over the existing telephone network above the telephony frequencies between 138 and 1,104 kHz. ADSL is, for example, the basis for the T-DSL offering from Deutsche Telekom AG.

DSP

The HG 1500 comes with DSP modules (DSP – Digital Signal Processor). A DSP provides for two VoIP channels.

DTMF

Abbreviation of "dual-tone multifrequency". DTMF is the multifrequency signaling mode for transmitting telephone numbers.Dual-tone multifrequency signaling, also known as tone dialing. Procedure for transmitting station number and other data. Each key on a terminal is assigned two frequencies. When you press a key, a tone is generated from the two frequencies assigned to it. Dialing a station number at a subscriber generates a sequence of tones based on mixture frequencies.

E

E-DSS1

Abbreviation of "European Digital Subscriber System No. 1“. E-DSS1 is the ISDN transport protocol normally used in Europe.

EF

Expedited Forwarded. Procedure for controlling broadband for Quality of Service.

Endpoint

A terminal device or endpoint is an H.323 component that can initiate or receive calls. Information flows begin or end here. Examples include clients, gateways or MCUs.

F

FTP

File Transfer Protocol. Platform-independent, TCP/IP-based network protocol for transmitting files between a client and a server (download and upload) and for simple file operations on the server.

G

G.711

G.711 is an ITU standard (International Telecommunication Union) standard for voice codecs for a data rate of 64 Kbps.

G.723.1

G.723.1 is an ITU standard (International Telecommunication Union) for voice codecs for transmission rates of 5.3 and 6.3Kbps.

G.729

G.729 is a group of ITU standards (International Telecommunication Union) for voice codecs for transmission rates of 8 Kbps.

Gatekeeper

A gatekeeper is an H.323 component that provides address conversion and access control services for endpoints in an H.323 network.

Gateway

A gateway is an H.323 component which connects H.323 endpoints in an IP network to telephones in the public telephone network. It translates between H.323 and ISDN protocols.

GSM

Global System for Mobile Communications. Standard for digital mobile communications and the basis for the German D and E cellular network.

GW

Abbreviation of "gateway".

H

H.323

H.323 is a group of standards which describes the transmission of call and fax data in packet-oriented networks such as IP networks. These standards are set down in the H.323 series of ITU-T recommendations (International Telecommunication Union – Telecommunication Standardization Sector).

HFA

Abbreviation for “HiPath Feature Access“

HiPath

Siemens HiPath (from "Highly Integrated Pathwork") is an innovative strategy which implements an extensive IP migration concept and thereby facilitates the integration of multimedia communication in existing corporate IP networks.

HTML

Hypertext Markup Language. Standard for displaying Web pages, developed by the World Wide Web (or W3) Consortium that is responsible for WWW standardization.

HTTP

Hypertext Transfer Protocol. Platform-independent, TCP/IP-based network protocol for data transmission in the World Wide Web.

HTTPS

Hypertext Transfer Protocol Secure. In contrast to HTTP, all data is transmitted in encrypted form.

I

IKE

Internet Key Exchange Protocol. Procedure for creating secure, authenticated connections. IKE supports various modes for exchanging keys. In the first phase, a secure, authenticated connection is established. In the second phase, the keys needed in the various protocols are exchanged and in general, individual keys (encryption, hashes) are derived from a master key.

ILS

Internet Locator Service. Directory service used primarily by Microsoft NetMeeting.

IP address

An IP address (IP – Internet Protocol) is a group of four numbers that identify a device. Each number can have a value between 0 and 255.

ISDN

Abbreviation of "Integrated Services Digital Network". ISDN is a fully digital public telephone network.

IVR

Abbreviation of "Interactive Voice Response". IVR is a procedure for forwarding calls if an individual line does not have numbers for dialing H.323 endpoints directly. HG 1500 does not support IVR.

L

LAN

Abbreviation of "Local Area Network". A local area network (LAN) connects PCs within a company.

LCP

Link Control Protocol. The LCP is used to set up, configure, test, and clear down a PPP connection. Connection setup is split into a number of phases. First of all, the connection parameters are negotiated, including which type of authentication (PAP, CHAP) should be performed.

LCS

Abbreviation for "Live Communication Server". Live Communication Server is the new Instant Messaging solution for your business and an upgradable realtime communication platform from Microsoft.

M

MAL

Abbreviation for "Magic Adaption Layer“ . Is the layer between application and platform.

MCU

Abbreviation of "Multipoint Controller Unit". MCUs are used for audio and video calls with multiple subscribers. They centralize data distribution and combine voice and video.

MD5

Message Digest algorithm that can create a 128-bit digital signature from a text of any length. The digital signature shows if the text was subsequently changed. MD5 is therefore used as an authentication procedure.

MIB

Abbreviation of "Management Information Base". An MIB compiles information and parameters of a network device. It is required for administration via SNMP.

MoH

Music on Hold. A melody or else an announcement text heard by the waiting subscriber when a connection is placed on hold or being forwarded within a telecommunication system.

MPPC

Microsoft Point-to-Point-Compression. Data compression procedure implemented for speeding up data transmissions.

MSC

Abbreviation for "Media Stream Control“. The Media Stream Control (MSC) monitors and administers the media streams that are routed via HG 1500. The MSC is used to transmit media data between LAN and ISDN.

Multicast

Multicast is the simultaneous transfer of data from a source to multiple recipients in networks.

N

NAT

Network Address Translation. Procedure for mapping private IP addresses to public IP addresses. NAT is necessary because public IP addresses are becoming scarcer. NAT is also used for data security because it conceals the internal LAN structure.

NTBA

Network terminator adapter. Is responsible for switching the Uk_0 interface (national) to the S_0 bus (international) for an ISDN basic access.

NTBBA

Network Termination Broadband Access. The NTBBA provides the network terminator for the broadband signal portion at the DSL subscriber line. In ADSL connections, this function is performed by the ADSL controller or the ADSL modem. The ADSL controller transforms the ADSL signal from the network interface into a mostly hardware-specific user interface suitable for the PC.

O

OAM

Operation, Administration, and Maintenance. OAM refers to all equipment that is used to operate, administer, and maintain networks.

OSPF

Open Shortest Path First. A routing protocol developed by the IETF. It is defined in RFC 1247 and based on the "Shortest Path First" algorithm developed by Edsger Dijkstra.

P

PAP

Password Authentication Protocol. Authentication procedure based on the point-to-point protocol, described in RFC 1334. In contrast to CHAP, the PAP protocol transmits the password for authentication in plaintext.

PBX

Abbreviation of "Private Branch Exchange". A PBX is a telecommunications system.

PCM

Physical Connection Management. Belongs to the functional blocks of Connection Management (CMT) in the FDDI ring.

PKI

Public Key Infrastructure Environment in which encryption and digital signature services based on the public key procedures are provided. In the case of this security structure, a certified party’s public key is authenticated on the basis of the relevant identification features by a digital signature from the certification authority (CA). Using PKI provides a trustworthy network environment in which communication is protected against unauthorized access by encryption and the authenticity of the communication partner is guaranteed by the digital signature.

PPP

Point to Point Protocol. Protocol for connection setup over dial-up lines (mostly over modem or ISDN). It supports the transport of a wide variety of network protocols, including the Internet’s IP protocol.

PPPoE

PPP over Ethernet. Use of the PPP network protocol over an Ethernet connection. PPPoE is currently used in Germany for ADSL connections.

PPTP

Point-to-Point Tunneling Protocol. Microsoft protocol for creating a Virtual Private Network (VPN); it supports PPP tunneling by an IP network.

PRI

Abbreviation of "Primary Rate Interface". A PRI is an ISDN interface comprising 23 (TS1) or 30 (TS2) B channels each with a capacity of 64 Kbps and one D channel with a capacity of 16 Kbps.

PSTN

Abbreviation of "Public Switched Telephone Network". PSTN is the worldwide public telephone network.

Q

Q.931

Q.931 is a call signaling protocol for setting up and clearing down calls.

QCU

Abbreviation for "QoS Monitoring Control Unit“.

QDC

Abbreviation for "Quality of Service Data Collection“.
The HiPath IP service QDC is a tool that collects data on HiPath products. This data is used to analyze the voice and network quality of the products.

QSIG

QSIG is a protocol for networking nodes which has been adapted by the ITU-T (International Telecommunication Union – Telecommunication Standardization Sector). QSIG can be used to network PBXs from different manufacturers.

QoS

Quality of Service. Prioritization of IP data packets on the basis of specific features and ISDN properties. This means that voice over IP (VoIP) transmissions that need a delay-free and continuous date stream, for example, can be given a higher priority than downloads from file servers or Web page callups.

R

RAS

Registration/Admission/Status is a protocol that regulates signaling between client and gateway in the area of automatic detection and registration.

RIP

The Route Information Protocol automatically generates and maintains network routes between routers that support this protocol.

Router

A router is a network component which connects subnetworks and transfers packets between them.

RSA

The RSA cryptosystem is an asymmetrical cryptosystem, that is, it uses different keys for encryption and decryption. It is named after its inventors Ronald L. Rivest, Adi Shamir and Leonard Adleman.

RTP

The Real-Time Transport Protocol governs the transmission of real-time audio and video packets from a terminal to one or more different terminals.

S

SCN

Abbreviation of "Switched Circuit Network". Switched circuit network that includes all digital telephone and cellular networks as well as analog telephone facilities connected over digital telephone switches.

SHA1

Security Hash Algorithm. This generates a unique 160-bit hash from a string. It is a one-way encryption procedure. In other words, the encrypted string can no longer be determined from the hash.

SIP

Abbreviation for "Session Initiation Protocol“. The SIP is a network protocol for setting up communication sessions between two or more stations. The protocol is specified in the RFC 3261.

SMTP

Simple Mail Transfer Protocol. Network transmission protocol for sending e-mails.

SNMP

Simple Network Management Protocol. The protocol is used to administer and monitor network elements that mainly originate in the LAN area (for example, routers, servers, etc.). SNMP transfers and changes management information and alarms. In LANs, a special SNMP management server can gather and evaluate this management information so that the network administrator has an overview of the most important events in the LAN.

SNTP

Simple Network Time Protocol. Protocol for transporting an official time in networks and the Internet. The SNTP protocol is characterized by its simplicity and an inaccuracy of several hundred milliseconds. It is defined in RFC 1769. The extended variant is called NTP.

SRTP

Abbreviation for "Secure Real-time Transport Protocol“.

SSL

Secure Socket Layer. Transmission protocol that supports encrypted communication. The advantage of the SSL protocol is that it supports the implementation of every higher protocol based on the SSL protocol. This guarantees application- and system-independence. SSL performs encryption using public keys that are confirmed by a third party in accordance with the X.509 standard. The high level of security is guaranteed by the fact that the decryption key must be individually redefined and is only saved at the user’s facility.

STAC

Data compression procedure implemented for speeding up data transmissions. The PPP Stac LZS Compression protocol described in RFC 1974 is a competitor procedure for MP-PC.

T

T.30

T.30 is an ITU standard for fax transmission. It specifies the functions within the first three layers for the implementation of the group 3 fax service.

T.38

T.38 is an ITU standard for fax transmission. It governs the communication of group 3 fax devices via IP networks.

TCP

Transmission Control Protocol. TCP sets up a virtual channel between two computers (more precisely: endpoints between two applications on these computers). Data can be transmitted in both directions on this channel. In most cases, TCP is based on the IP protocol. It belongs to Layer 4 of the OSI network layer model.

Terminal Device

A terminal device or endpoint is an H.323 component that can initiate or receive calls. Information flows begin or end here. Examples include clients, gateways or MCUs.

TFTP

Trivial File Transfer Protocol described in RFC 783. This protocol does not support user authentication, directory switching or directory listings. It is only used for uploading and downloading files directly with get and put commands.

TLS

Abbreviation for "Transport Layer Security“ or Secure Sockets Layer (SSL) is an encryption protocol for data transmissions on the internet. TLS is the standardized further development of SSL 3.0.

U

UDP

User Datagram Protocol. The User Datagram Protocol (UDP) supports wireless data exchange between computers. The UDP was also developed to enable application processes to send datagrams and thereby to satisfy the requirements of transaction-oriented traffic. UDP is based directly on the IP protocol. UDP is a basic protocol mechanism that does not guarantee datagram delivery to a destination partner or provide mechanisms to protect against duplication or ordering errors. The functional scope of the UDP protocol is limited to the transport service, connection multiplexing and error correction.

URL

Uniform Resource Locator. Addressing form for Internet files that are used primarily in the World Wide Web (WWW). The URL format provides a unique designation for all documents on the Internet. It describes the address of a document or object that can be read by a WWW browser.

UTC

Universal Time Coordinated. This is a world time and as such replaces Greenwich Mean Time (GMT). UTC time is a reference time that is used as a global standard. The coordinated world time uses International Atomic Time (TAI) as the reference time. These are both identical apart from the leap seconds that may be added at the end of June and/or December. The reference point for Universal Time Coordinated (UTC) is the 0° degree of longitude.

V

VCAPI

Virtual CAPI. VCAPI lets you reach remote computers using ISDN-specific protocols (for example, Euro File Transfer).

VoIP

The Voice over Internet Protocol (VoIP) controls telephone calls via IP networks.

W

WAN

Wide Area Network. A WAN is a network that connects multiple LANs over long distances. For example, a WAN network can connect several branches of a company spread over different locations.

WBM

Web Based Management. This is an option for configuring PCs and telecommunication hardware and software over a Web browser. No specific software needs to installed locally. The software is implemented as a Web application and can be called up over HTTP or HTTPS.

X

XML

Extensible Markup Language. Standard developed by the W3 Consortium for the definition of markup languages. The best-known markup languages defined with XML are XHTML, SVG, and WML.

XSL

Extensible Stylesheet Language. Standard developed by the W3 Consortium for formatting and conversion (in the XSLT component) of XML-based markup languages into other formats.

B Traces and Events

This reference chapter contains:

- Traces, described according to individual trace components and trace profiles. Traces can be administered using the WBM (See Section 6.6, "Traces", and in particular Section 6.6.7, "Trace Components" and Section 6.6.6, "Trace Profiles").
- Events, described according to individual event codes. Events can be administered using the WBM (See Section 6.7, "Events").

Information about creating traces

IPTRK_OVERVIEW has a minimum impact on the HiPath system. You can therefore use it if you want to create a trace during a period of high traffic volume (during standard working hours, for instance).

Activating IPTRK_DETAIL generates considerable load on the HiPath system, which may result in system downtime. This setting should only be used during periods of low traffic volume (at night, for instance). A service technician must be on site when this setting is used.

B.1 Traces

The trace descriptions are subdivided into logical sections. Each individual section is organized according to the trace components and the trace profiles created in the factory.

B.1.1 Evaluating Trace Profiles

The following table lists the trace profiles and components that are useful when used with the listed features and scenarios. It also displays the settings for low and high load.

Feature	**Scenario**	**Specialities**	**Useful trace profiles and trace components** (Low system load **/** high system load)	**Additional tools**
Call scenarios				
	Intercept		DEVMGR=6/3, LAN=6, SCN=6 + Profile: IPTRK_DETAIL **/** IPTRK_OVERVIEW + default traces in the system	
	Answering calls			
	Establishing a connection	One way / two way, no payload		Wireshark LAN Trace
		Connection attempt fails		Wireshark LAN Trace
		Internal nodes		
		Across all nodes		Wireshark LAN Trace
	Conferencing	Internal nodes	DEVMGR=6/3, LAN=6, SCN=6 + Profile: IPTRK_DETAIL **/** IPTRK_OVERVIEW + default traces in the system	
		Across all nodes		Wireshark LAN Trace
		external		
		Subscriber cannot be included		
		One way / two way, no payload		Wireshark LAN Trace
	MoH	No MoH	DEVMGR=6/3, LAN=6, SCN=6 + Profile: IPTRK_DETAIL **/** IPTRK_OVERVIEW + default traces in the system	
		No payload after MoH		
		Monitoring calls during / instead of MoH		
		Poor MoH sound quality		Wireshark LAN Trace

Feature	Scenario	Specialities	Useful trace profiles and trace components (Low system load / high system load)	Additional tools
	Groups	One way / two way, no payload after group pickup	DEVMGR=6/3, LAN=6, SCN=6 + Profile: IPTRK_DETAIL / IPTRK_OVERVIEW + default traces in the system	
		Call cannot be answered		
		Group members still called after answering		
		Individual group members not called		
	General payload scenarios		DEVMGR=6/3, LAN=6, SCN=6 + Profile: IPTRK_DETAIL / IPTRK_OVERVIEW + default traces in the system	Wireshark LAN Trace
Fax/modem scenarios				
	Internal nodes		MPH 9, DEVMGR=6	Wireshark LAN Trace
	External nodes		MPH 9/6, DEVMGR 6, H323=9/6, HSA_SYSTEM=6	Wireshark LAN Trace
	Abort		MPH 3, H323=9, HSA_SYSTEM=6	Wireshark LAN Trace
	Negotiation			Wireshark LAN Trace
Phone				
	Speed dial buttons		DSS1=6	
	Busy signaling		IPTRK_Overview, HSA_SYSTEM=3; H323=3 + default traces in the system	
	Display		HFAM=6	
	Terminal failure/ logoff		HFAM=9	
	LDAP	Connect to server	LDAP=6/3	Wireshark LAN Trace
		Erroneous/no results		Wireshark LAN Trace
VPN				
	Node network		IPSEC,IPSEC_CMCONFIG_CACERT 6, IPSEC_CMCONFIG_KEYCERT 6 ,VPN_RULE_GENERATOR 6, DYNDNS_NRT 6,PPPM_TBAS 6,EVTLOG 3,SECURITY_SVC 9	
	Teleworker			
Internet Telephony Service Provider				
	Call scenarios, see above where comparable		SIP trunk overview	

Feature	Scenario	Specialities	Useful trace profiles and trace components (Low system load **/** high system load)	Additional tools
SIP telephones				
	Display		SIP subscriber overview	
	Terminal failure/ logoff			
Routing				
	general		CAR_ALIVE=6	
DSL				
	Access		PPP_TBAS=9; PPPM_TSTD=6, IPSTACK_GLOBAL=6	
	Data transfer			
	Connection cleardown			
PPP				
	Networking via S_0/ S_2		PPP_TBAS=9; PPPM_TSTD=6, IPSTACK_GLOBAL=6 (for ISDN: PPP_CC=6)	
	Remote access			
vCAPI				
	Fax transmission (see scenario above)		CAPI_MGR=3, CAPI_INT:=3, VCAPI=3, VCAPI_DISP=6, FAXCONV_LOGT=6, FAXCONV_IF=6	
	Voice transmission (see scenario above)		CAPI_MGR=3, CAPI_INT:=3, VCAPI=3, VCAPI_DISP=6	
	Transfer			
HG 1500 reset				
	known catalyst through one of the aforementioned features		All HG 1500 diagnosis protocols including trace recording (traces to be activated depending on the relevant/triggering components) (Explorer -> Actions -> Manual Actions -> All Protocols)	Wireshark LAN Trace, if necessary
	unknown triggers		All HG 1500 diagnosis protocols (Explorer -> Actions -> Manual Actions -> All Protocols)	Wireshark LAN Trace, if necessary

B.1.2 Overview: Trace Components

The table is intended to help you find specific trace components faster. The table is sorted alphabetically according to trace components.

Trace Component	Section
ADMIN	B.1.5, „OAM/WBM Traces“
ASP	B.1.22, „SW Platform Trace“
ASP_DSP	
ASP_DSP_EVENT	B.1.22, „SW Platform Trace“
ASP_DSP_IFTASK	
ASP_DSP_INIT	
ASP_DSP_IOCTL	B.1.22, „SW Platform Trace“
ASP_DSP_STAT	B.1.22, „SW Platform Trace“
ASP_FAX	
ASP_PS	
ASP_VMOD	
ASP_VMUX	
ATR	
BSD44_PROC	
CAPIINT	
CAPIMGR	
CAR	B.1.11, „IP Trunk Support Trace“
CAR_ALIVE	B.1.11, „IP Trunk Support Trace“
CCE	
CFG_CODECS	B.1.12, „H.323 trace“
CFG_H235	B.1.12, „H.323 trace“
CFG_H235	B.1.12, „H.323 trace“
CFG_H323	B.1.12, „H.323 trace“
CFG_H323GKI	B.1.12, „H.323 trace“
CFG_H323GWI	B.1.12, „H.323 trace“
CFG_H323I	B.1.12, „H.323 trace“
CMGMT	B.1.5, „OAM/WBM Traces“
CN	B.1.10, „SIP-SCN protocol trace“
CNIWK	B.1.10, „SIP-SCN protocol trace“
CNQIWK	B.1.10, „SIP-SCN protocol trace“
CNQ	B.1.10, „SIP-SCN protocol trace“
CNQIWK	
COMMUNITIES	B.1.5, „OAM/WBM Traces“
CPMSG	

Trace Component	Section
DELIC_DRIVER	B.1.22, „SW Platform Trace“
DEVMGR	B.1.13, „Device Manager Trace“
DGW_DISP	
DISPATCH	B.1.5, „OAM/WBM Traces“
DMC	
DSA	B.1.19, „DS Adapter Trace“
DSP	B.1.22, „SW Platform Trace“
DSS1	B.1.10, „SIP-SCN protocol trace“
EMAIL_MANAGER	B.1.5, „OAM/WBM Traces“
EMIWK	
ERH_ADMISSION	B.1.20, „Endpoint Registration Handler (ERH) Trace“
ERH_CONFIGURATION	B.1.20, „Endpoint Registration Handler (ERH) Trace“
ERH_REGISTRATION	B.1.20, „Endpoint Registration Handler (ERH) Trace“
EVTLOG	B.1.4, „System Trace“
EVTLOGTRAP	
FAXCONV_IF	B.1.22, „SW Platform Trace“
FAXCONV_LOGT	B.1.22, „SW Platform Trace“
FAXCONV_OS	B.1.22, „SW Platform Trace“
FAXCONV_T30DOWN	B.1.22, „SW Platform Trace“
FAXCONV_T30INT	B.1.22, „SW Platform Trace“
FAXCONV_T30UP	B.1.22, „SW Platform Trace“
FAXCONVERTER	B.1.22, „SW Platform Trace“
Gateway	
GSA	B.1.8, „GSA Trace“
GWHIP	B.1.18, „HIP Trace“
GWSI	
H323	B.1.12, „H.323 trace“
H323_CLIENTS	
H323_EPT	
H323IWK	
H323MSG	
H323_GLOBAL_SI_DOWNLOADS	B.1.12, „H.323 trace“
H323Client	B.1.8, „GSA Trace“
HFA_ADAPTER	B.1.9, „CP Trace“
HFA_MANAGER	B.1.9, „CP Trace“
HFAM	
HSA_H225_CS	B.1.12, „H.323 trace“

Trace Component	Section
HSA_H225_RAS	B.1.12, „H.323 trace“
HSA_H245	B.1.12, „H.323 trace“
HSA_H323_NSD	
HSA_NSD	B.1.12, „H.323 trace“
HSA_RV_LOG	B.1.12, „H.323 trace“
HSA_SYSTEM	B.1.12, „H.323 trace“
IFTABLE	B.1.13, „Device Manager Trace“
ILS_CLIENT	
IP_ROUTES	
IPACCSRV	B.1.7, „IP Accounting Trace“
IPMONITOR	
IP_FILTER	B.1.22, „SW Platform Trace“
IPNC	B.1.9, „CP Trace“
IPSEC	B.1.21, „IPsec Trace“
IPSTACK	B.1.22, „SW Platform Trace“
IPSTACK_1LAN_IF	B.1.22, „SW Platform Trace“
IPSTACK_2LAN_IF	B.1.22, „SW Platform Trace“
IPSTACK_GLOBAL	B.1.22, „SW Platform Trace“
IPSTACK_HIP_IF	B.1.18, „HIP Trace“
IPSTACK_IPFILTER	
IPSTACK_MACFILTER	
IPSTACK_NAT	B.1.22, „SW Platform Trace“
IPSTACK_ROUTE	B.1.22, „SW Platform Trace“
IPSTACK_SNTPS	
ISDN_FM	B.1.10, „SIP-SCN protocol trace“
LAN	B.1.13, „Device Manager Trace“
LDAP	B.1.14, „LDAP Trace“
LICMGMT	B.1.6, „License Management Trace“
LLC_CALL	B.1.15, „LANLeg Controller Trace (LLC)“
LLC_H245	B.1.15, „LANLeg Controller Trace (LLC)“
LLC_LINK	B.1.15, „LANLeg Controller Trace (LLC)“
LLC_Q931	B.1.15, „LANLeg Controller Trace (LLC)“
MAC_FILTER	B.1.22, „SW Platform Trace“
MANAGER	B.1.5, „OAM/WBM Traces“
MAT_STREAM	B.1.22, „SW Platform Trace“
Media_Payload_Handler	B.1.16, „Media-Payload-Handler-Trace (MPH)“
MGAF_TBL	B.1.5, „OAM/WBM Traces“

Trace Component	Section
MPH	
MSC	B.1.22, „SW Platform Trace“
MSC_DSP	
MSC_QM	B.1.22, „SW Platform Trace“
MSC_RTCP	B.1.22, „SW Platform Trace“
MSP_RTP_MOD	B.1.22, „SW Platform Trace“
MSC_TMT	B.1.22, „SW Platform Trace“
MSP_CAPI_IF	B.1.22, „SW Platform Trace“
MSP_HDLC	B.1.22, „SW Platform Trace“
MSP_PPP_IF	B.1.22, „SW Platform Trace“
MSP_RTP_MOD	
NS	B.1.11, „IP Trunk Support Trace“
NU	
NWRS	
NU_LEGCTRL	B.1.9, „CP Trace“
OAM	B.1.5, „OAM/WBM Traces“
OAM_ACTIONLIST	B.1.5, „OAM/WBM Traces“
OSF_PCS	
PERFM_PL	
PERFM_SIG	B.1.12, „H.323 trace“
PLATFORM	
PORT	
PPP_CC	B.1.9, „CP Trace“
PPP_STACK_CUST_IF	
PPP_STACK_DBG_IF	B.1.22, „SW Platform Trace“
PPP_STACK_PROC	B.1.22, „SW Platform Trace“
PPPM_TBAS	B.1.22, „SW Platform Trace“
PPPM_TEXT	B.1.22, „SW Platform Trace“
PPPM_TSTD	B.1.22, „SW Platform Trace“
PPPOE_DBG_IF	B.1.22, „SW Platform Trace“
PPPOE_PROC	B.1.22, „SW Platform Trace“
PPTP_DBG_IF	B.1.22, „SW Platform Trace“
PPTP_PROC	B.1.22, „SW Platform Trace“
Q931	B.1.10, „SIP-SCN protocol trace“
QDC	B.1.25, „QDC trace“
REG	B.1.11, „IP Trunk Support Trace“
RIPCONF	B.1.5, „OAM/WBM Traces“

Trace Component	Section
RTPQM	B.1.12, „H.323 trace“
SCN	B.1.13, „Device Manager Trace“
SCNPAY	
SDR	
SECURITY_SVC	B.1.5, „OAM/WBM Traces“
SENDTMT	B.1.4, „System Trace“
SERVICE_TRACE	
SESSION_MGMT	B.1.5, „OAM/WBM Traces“
SIP	
SIP_CFG	
SIP_CFG_INT	
SIP_FM	B.1.26, „SIP_FM trace (SIP feature manager)“
SIP_HT	
SIP_REG	
SIP_SA	
SNMP	B.1.5, „OAM/WBM Traces“
SOH	B.1.22, „SW Platform Trace“
SPL	
SS	
SSM	
STATIC_ROUTES	
STREAMS	B.1.22, „SW Platform Trace“
SUSY_CCE	B.1.12, „H.323 trace“
SUSY_IPSTACK_SNTPS	B.1.17, „SNTPS trace“
SUSY_P2P	B.1.24, „P2P trace“
SUSY_CFG_CODECS	B.1.27, „SIP trace“
SUSY_DLI_SOFTWARE	B.1.23, „DLI trace“
SUSY_DLI_WORKPOINT	B.1.23, „DLI trace“
SUSY_SIP	B.1.27, „SIP trace“
SUSY_SIP_CFG	B.1.27, „SIP trace“
SUSY_SIP_CFG_INT	B.1.27, „SIP trace“
SUSY_SIP_HT	B.1.27, „SIP trace“
SUSY_SIP_REG	B.1.27, „SIP trace“
SUSY_SIP_SA	B.1.27, „SIP trace“
SWCONF	B.1.5, „OAM/WBM Traces“
SYSTEM	B.1.4, „System Trace“
T90	B.1.22, „SW Platform Trace“

Trace Component	Section
TESTLW	B.1.22, „SW Platform Trace“
THREAD_MAN	
TIME_SYNC	B.1.5, „OAM/WBM Traces“
TOOLS	B.1.5, „OAM/WBM Traces“
TRAP	B.1.5, „OAM/WBM Traces“
VCAPI	
VCAPI_DISP	
WEBAPPL	B.1.5, „OAM/WBM Traces“
Web server	B.1.5, „OAM/WBM Traces“
WEBSERVER_STATISTIC	
WEBSRV_CLIENT_IF	B.1.5, „OAM/WBM Traces“
WEBSRV_SYS_IF	B.1.5, „OAM/WBM Traces“
X25	B.1.22, „SW Platform Trace“
X75	B.1.22, „SW Platform Trace“
XMLUTILS	

B.1.3 Overview: Trace Profiles

The table is intended to help you find specific, **predefined** trace profiles faster. The table is sorted alphabetically according to trace profiles.

Trace Profile	Section
AdminDetails	B.1.5, „OAM/WBM Traces“
AdminOverview	B.1.5, „OAM/WBM Traces“
CCE Details	B.1.12, „H.323 trace“
CCE overview	B.1.12, „H.323 trace“
DEVMGR-CP	B.1.13, „Device Manager Trace“
DEVMGR-Overview	B.1.13, „Device Manager Trace“
DEVMGR-Startup	B.1.13, „Device Manager Trace“
GSA	B.1.8, „GSA Trace“
H323_ADMIN	B.1.12, „H.323 trace“
H323_ANALYSIS_CALL	B.1.12, „H.323 trace“
H323_ANALYSIS_STARTUP	B.1.12, „H.323 trace“
H323_CALL_CONTROL	B.1.12, „H.323 trace“
H323_DEVICE_CONTROL	B.1.12, „H.323 trace“
H323_OVERVIEW	B.1.12, „H.323 trace“
H323_RAS_SIGNALLING	B.1.12, „H.323 trace“
H323_RAS_SIGNALLING_DETAIL	B.1.12, „H.323 trace“
H323_TRUNKING_DETAIL_SIG	B.1.12, „H.323 trace“

Trace Profile	Section
H323_TRUNKING_PAYLOAD	B.1.12, „H.323 trace“
H323_TRUNKING_SIGNALLING	B.1.12, „H.323 trace“
H323VoiceCall	B.1.22, „SW Platform Trace“
H235_DETAILS	B.1.12, „H.323 trace“
H235_OVERVIEW	B.1.12, „H.323 trace“
HFAVoiceCall	B.1.22, „SW Platform Trace“
HIP Standard	B.1.18, „HIP Trace“
IP_Accounting_Client	B.1.7, „IP Accounting Trace“
IP_Accounting_Results	B.1.7, „IP Accounting Trace“
IPNC-Detailed	B.1.9, „CP Trace“
IPNC-Error	B.1.9, „CP Trace“
IPNC-Internal	B.1.9, „CP Trace“
IPNC-Std	B.1.9, „CP Trace“
IPTRK_SUPP_CAR_ALIVE	B.1.11, „IP Trunk Support Trace“
IPTRK_SUPP_CAR_ALIVE	B.1.11, „IP Trunk Support Trace“
IPTRK_SUPP_CAR_ALIVE	B.1.11, „IP Trunk Support Trace“
IPTRK_DETAILS	B.1.11, „IP Trunk Support Trace“
IPTRK_OVERVIEW	B.1.11, „IP Trunk Support Trace“
IPTrunkVoiceCall	B.1.22, „SW Platform Trace“
ISPAccessISDN	B.1.22, „SW Platform Trace“
ISPAccessModem	B.1.22, „SW Platform Trace“
ISPAccessPPPPoE	B.1.22, „SW Platform Trace“
ISPAccessPPTP	B.1.22, „SW Platform Trace“
License_Management	B.1.6, „License Management Trace“
LL_H323CallDetails	B.1.19, „DS Adapter Trace“
LL_H323CallOverview	B.1.19, „DS Adapter Trace“
PPPISDNCall	B.1.22, „SW Platform Trace“
PPPModemCall	B.1.22, „SW Platform Trace“
QdcOverview	B.1.25, „QDC trace“
OdcData	B.1.25, „QDC trace“
OdcDetails	B.1.25, „QDC trace“
SIP_FM-Std	B.1.26, „SIP_FM trace (SIP feature manager)“
SystemInfo	B.1.4, „System Trace“
T30_38_FAX_CON	B.1.22, „SW Platform Trace“
T30_38_FAX_XFER	B.1.22, „SW Platform Trace“
T90_CON	B.1.22, „SW Platform Trace“
T90_XFER	B.1.22, „SW Platform Trace“

Trace Profile	Section
ToneProcessing	B.1.22, „SW Platform Trace“
X25_CON	B.1.22, „SW Platform Trace“
X25_XFER	B.1.22, „SW Platform Trace“
X75_CON	B.1.22, „SW Platform Trace“
X75_XFER	B.1.22, „SW Platform Trace“
X75_XFER	B.1.22, „SW Platform Trace“

B.1.4 System Trace

B.1.4.1 Trace Components

SYSTEM

Configured default trace level: **3** (INTER)

Trace level **3** (INTER): always on; global system information (do not change this).

EVTLOG

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): ensure that events are also visualized on the console, in the trace log and via LAN trace.

Trace level **6** (INTRA): mutex blocking situations.

EVTLOGTRAP

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): enable/disable a trace profile for a registered event.

SENDTMT

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): error when sending or posting a message (extra info for TMT).

Trace level **3** (INTER): receiving a message (extra info for TMT).

SUSY_FP_RECOVERY

Configured default trace level: 0 (T_STATUS)

Trace level **0** (T_STATUS): System and Message Trace and Dump
-Preselection of Recovery or additional
data for unexpected software errors

General trace components (Recovery) of the feature process (FP)
T_STATUS : System Trace, Message Trace and Dump, which were preselected from Recovery or supplementary data relating to unexpected software errors.
T_INTER: information concerning inter-component actions.
T_INTRA: information concerning component-internal actions. T_DETAIL: detailed information on the component level.

B.1.4.2 Trace Profiles

SystemInfo

Profile enabled by default: **no**

Contains the following trace components and assigned trace levels:
Trace component **SYSTEM**, trace level **3**
Trace component **EVTLOG**, trace level **3**.

Standard trace profile to monitor system-specific data, such as, important status messages and event information.

FP_COMMON_TRACE

Profile enabled by default: **yes**

Trace component **SUSY_FP_RECOVERY**: T_STATUS

B.1.5 OAM/WBM Traces

B.1.5.1 Trace Components

TOOLS

Configured default trace level: **0** (STATUS)

Trace level **6** (INTRA): finishing of class *OSThread* threads.

DISPATCH

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): list of header data for all messages sent via the dispatcher. This impacts system performance. It is the preferred setting for getting an overview of all messages sent via the dispatcher.

Trace level **6** (INTRA): this has a very serious impact on system performance. This setting should only be used to obtain details about the message.

Trace level **6/9** (INTRA/DETAIL):
problems with logical message queue (see remarks above).
Incorrectly encoded component message handling, internal software problems:
- Message not unregistered (wrong RecvListType),
- Message not registered (wrong RecvListType),
- Posting of message not successful (wrong RecvListType),
- Sending of message not successful (wrong RecvListType),
- Unregistered posting of message,
- Unregistered sending of message.

MANAGER

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): problems with deleting, adding or changing manager objects.

ADMIN

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): incoming and outgoing admin messages with all details. This impacts system performance.

Trace level **9** (DETAIL): incoming and outgoing admin messages with all details as well as internal admin messages, such as, polling information, for example. This has a strong impact on system performance.

OAM

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): data flow of uploads and backup, export and upgrade actions (requires execution of admin action).

Trace level **3** (INTER): data flow of routing wizard actions (not relevant for HG 1500).

Trace level **4**: stack overflow information for all tasks.

Trace level **5**: stack usage information for all tasks.

Trace level **5**: execution of OAM threshold timer.

Trace level **6** (INTRA): OAM task queue problems (queue full, etc.).

Trace level **6** (INTRA): problems when configuring SNTP time synchronization (not relevant to HG 1500, moved to TIME_SYNC component).

TIME_SYNC

Configured default trace level: **0** (STATUS)

Trace level **6** (INTRA): problems when configuring SNTP Time Synchronization (not relevant to HG 1500).

SWCONF

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): fatal errors, such as, missing parameters, unknown commands, etc.

Trace level **3** (INTER): status information about job handling and process.

Trace level **6** (INTRA): detailed information about all types of jobs, such as, HTTP file transfer, MGAF, etc.

MGAF_TBL

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): fatal errors, such as, missing parameters, invalid session ID, etc.

Trace level **3** (INTER): login/logout/connection status information.

Trace level **6** (INTRA): detailed socket information.

EMAIL_MANAGER

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): information about sending mails and connections to the mail server

RIPCONF

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): RIP not initialized, loopback entry not initialized, own RIP entry not initialized.

SESSION_MGMT

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): information about: GetUserInfo, SessionUpdate, SessionIDVerification.

Trace level **6** (INTRA): admin session creation or verification (only >= 2.1), admin session update, deletion of expired admin session, admin session closure, write token/access handling (get/release).

Trace level **9** (DETAIL): continuously writes admin session data with/without synching.

OAM_ACTIONLIST

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): execution of automatic actions (garbage collection, gatekeeper switchback, etc.).

COMMUNITIES

Configured default trace level: **0** (STATUS)

Trace level **6** (INTRA): add/delete/change SNMP read/write/trap communities. Receive SNMP trap destinations via autodiscovery.

TRAP

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): important status information (trap from IP address and port, SNMP trap version). Fatal error when receiving traps.

Trace level **6** (INTRA): status information, such as:
- trap receipt OK,
- trap received from local host or from somewhere else,
- error information.

Add/remove trap to/from trap buffer.

Trace level **9** (DETAIL): detailed information.

SNMP

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status display (0) of detailed information (9) on configuration data (via SNMP) and internal SNMP information and problems.
Consult developers before using this trace component.

CMGMT

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status display (0) of detailed information (9) on CLI actions.
Consult developers before using this trace component.

WEBSRV_CLIENT_IF

Configured default trace level: **0** (STATUS)

Trace level **1**: trace all URLs and URIs requested by a HTTP client (normally a browser). Only the name of the URI is displayed.

Trace level **3** (INTER): HTTP socket trace (without trace polling requests).
HTTP data including the HTTP stack is displayed as sent from the browser.
HTTP data including the HTTP stack of dynamic pages (XML) is displayed as sent to the browser.

Trace level **4**: as for level 3, but with trace polling requests.

Trace level **6** (INTRA): HTTP socket trace (without trace polling requests).
HTTP data including the HTTP stack is displayed as sent from the browser. HTTP data including the HTTP stack of dynamic pages (XML) and generated/static pages (HTML) is displayed as sent to the browser.

WEBSRV_SYS_IF

Configured default trace level: **0** (STATUS)

Trace level **2**: Note: this trace does not contain trace information for trace polling requests.
Data sent to and from the gatekeeper (gateway detection, autodiscovery).

Trace level **3** (INTER): administration interface trace.
Data that is sent to the administration interface, and XML data that is received by the administration interface.

Trace level **6** (INTRA): user and password information.

Trace level **9** (DETAIL): login data sent to the administration interface, response sent to a client, and internal parameter table information.

Web server

Configured default trace level: **0** (STATUS)

Trace level **6** (INTRA): input/output of important web server functions and methods (for developers).

WEBAPPL

Configured default trace level: **0** (STATUS)

Trace level **3/6** (INTER/INTRA): input/output of important web server application functions and methods (for developers).

SECURITY_SVC

Configured default trace level: **0** (STATUS)

Trace level **0**: fatal errors, such as, missing parameters, unknown commands, etc.

Trace level **3**: status information and handling.

Trace level **6**: detailed information, method calls.

B.1.5.2 Trace Profiles

AdminOverview

Profile enabled by default: **No**

Contains the following trace components and assigned trace levels:
Trace component **ADMIN**, trace level **3**
Trace component **WEBSRV_CLIENT_IF**, trace level **1**
Trace component **WEBSRV_SYS_IF**, trace level **2**.

Overview for the administration data flow. Important information about WEBSERVER IF is shown. Detailed admin messages are displayed on the admin receiver IF. This profile does not impact system performance.

AdminDetails

Profile enabled by default: **No**

Contains the following trace components and assigned trace levels:
Trace component **ADMIN**, trace level **9**
Trace component **WEBSRV_CLIENT_IF**, trace level **1**
Trace component **WEBSRV_SYS_IF**, trace level **2**
Trace component **WEBSERVER**, trace level **6**
Trace component **WEBAPPL**, trace level **6**.

Details for the administration data flow. The details are displayed on all interfaces (WBM/Admin Receiver). This profile does not have a serious impact on system performance.

B.1.6 License Management Trace

B.1.6.1 Trace Components

LICMGMT

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): not used

Trace level **3** (INTER): messages received and sent via the admin interface.

Trace level **6** (INTRA): function exits and results.

Trace level **9** (DETAIL): more details.

B.1.6.2 Trace Profiles

License_Management

Profile enabled by default: **No**

Contains the following trace components and assigned trace levels:
Trace component **LICMGMT**, trace level **6**
Trace component **DEVMGR**, trace level **3**
Trace component **SCN**, trace level **3**
Trace component **HFA_Manager**, trace level**3**.

Trace for analyzing License Management.

B.1.7 IP Accounting Trace

B.1.7.1 Trace Components

IPACCSRV

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): logon, logoff.

Trace level **3** (INTER): messages sent/received via message queue/socket, IP client status.

Trace level **6** (INTRA): function entries and exits.

Trace level **9** (DETAIL): more details.

B.1.7.2 Trace Profiles

IP_Accounting_Client

Profile enabled by default: **No**

Contains the following trace components and assigned trace levels:
Trace component **IPACCSRV**, trace level **6**

Trace for problems with the IP Accounting client.

IP_Accounting_Results

Profile enabled by default: **No**

Contains the following trace components and assigned trace levels:
Trace component **IPACCSRV**, trace level **6**
Trace component **PPTP_PROC**, trace level **3**
Trace component **PPPOE_PROC**, trace level **3**
Trace component **PPP_STACK_PROC**, trace level **3**.

Trace for analyzing IP Accounting.

B.1.8 GSA Trace

B.1.8.1 Trace Components

GSA

Configured default trace level: **1**

Trace level **1**: Gatekeeper Supervisory Application trace for tracing very important messages.

Trace level **4**: trace for tracing semi-important messages (semi-detailed).

Trace level **9** (DETAIL): trace for low-importance and very detailed message tracing.

GSA_DISP

Configured default trace level: **1**

Trace level **1**: trace for very important message tracing for GSA Dispatcher.

Trace level **4**: trace for tracing semi-important messages (semi-detailed).

Trace level **9** (DETAIL): trace for low-importance and very detailed message tracing.

B.1.8.2 Trace Profiles

GSA

Profile enabled by default: **No**

Contains the following trace components:
Trace component **GSA**
Trace component **GSA_DISP**

Gatekeeper Supervisory Application, GSA Dispatcher.

B.1.9 CP Trace

B.1.9.1 Trace Components

H323Client

Configured default trace level: **3** (INTER)

Trace level **0** (STATUS): not used.

Trace level **3** (INTER): messages received from other components: OAM.

Trace level **6** (INTRA): no sub-components: same as level 3.

Trace level **9** (DETAIL): level 6 + details on processing within individual methods/functions and messages sent to other components: NWRS, system interface.

IPNC

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): only trace error and status conditions.

Trace level **3** (INTER): level 0, + messages received from other components (SI, HFAM, NU, H323, SSM).

Trace level **6** (INTRA): level 3, + interface between subcomponents (IPNCC, IPNCA).

Trace level **9** (DETAIL): level 6 + details on processing within individual methods/functions.

NU_LEGCTRL

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): startup/shutdown.

Trace level **3** (INTER): messages received and sent, parameter output.

Trace level **6** (INTRA): function entries and exits, status of call objects.

Trace level **9** (DETAIL): checking of variables and pointers.

HFA_ADAPTER

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): startup/shutdown.

Trace level **3** (INTER): received and sent messages, creation and destruction of objects.

Trace level **6** (INTRA): calling methods.

Trace level **9** (DETAIL): more details.

HFA_MANAGER

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): startup/shutdown.

Trace level **3** (INTER): received and sent messages, creation and destruction of objects.

Trace level **6** (INTRA): calling methods.

Trace level **9** (DETAIL): more details.

PPP_CC

Configured default trace level: **3** (INTER)

Trace level **0** (STATUS): not used.

Trace level **3** (INTER): external interfaces of the PPP Call Control to other components, for example, PPP Manager.

Trace level **6** (INTRA): external and internal interfaces of PPP Call Control.

Trace level **9** (DETAIL): external and internal interfaces as well as details on processing within PPP Call Control.

B.1.9.2 Trace Profiles

IPNC-Std

Profile enabled by default: **No**

Contains the following trace components:
Trace component **IPNC**, trace level **3**
Trace component **SI**, trace level **3**

Trace component **SSM**, trace level **3**
Trace component **NU**, trace level **3**
Trace component **HFAM**, trace level **3**
Trace component **SPL**, trace level **3**.

Standard trace profile for problems with establishment/termination of PPP connections.

IPNC-Error

Profile enabled by default: **No**

Contains the following trace components:
Trace component **IPNC**, trace level **0**.

Trace profile for tracing error and status conditions only.

IPNC-Internal

Profile enabled by default: **No**

Contains the following trace components:
Trace component **IPNC**, trace level **6**.

Trace profile for internal IPNC analysis.

IPNC-Detailed

Profile enabled by default: **No**

Contains the following trace components:
Trace component **IPNC**, trace level **9**
Trace component **SI**, trace level **3**
Trace component **NU**, trace level **3**
Trace component **HFAM**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **SPL**, trace level **3**.

Trace profile for detailed IPNC analysis.

B.1.10 SIP-SCN protocol trace

B.1.10.1 Trace Components

CN

Configured default trace level: **0**

Trace level **0**: short description of messages, normal operation traces.

Trace level **3/6**: long description of messages.

Trace level **9**: trace all information available.

CNQ

Configured default trace level: **3**

Trace level **0**: ISDN trace.

Trace level **1**: ISDN trace with data

Trace level **2**: Transport container trace

Trace level **3**: Trace all parameters including transport container.

Trace level **4**: TMT trace.

Trace level **5**: TMT trace and ISDN trace.

Trace level **6**: TMT trace and ISDN trace.

Trace level **7**: Trace all parameters including transport container.

Trace level **8**: TMT-TMT trace and all parameters including transport container.

Trace level **9**: TMT-TMT trace and all parameters including transport container and ASN.1 trace.

DSS1

Configured default trace level: **3**

Trace level **0** - 9 see CNQ

ISDN_FM

Configured default trace level: **3**

Trace level **3:** ISDN FM Trace (default)

CNIWK

Configured default trace level: **0**

Trace level **0**: normal operation traces.

Trace level **3/6**: traces for encoding/decoding IEs.

Trace level **9**: trace all information available.

CNQIWK

Configured default trace level: **3**

Trace level **0** - 9 see CNQ

Q931

Configured default trace level: **3**

Trace level **0** - 9 see CNQ

B.1.10.2 Trace Profiles

None.

B.1.11 IP Trunk Support Trace

B.1.11.1 Trace Components

CAR_ALIVE

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): returns the results of alive checks (OK/NOTOK) for the nodes and IP addresses used. PSU P is used to trace alive checks for a node.

Trace level **6** (INTRA): returns the function calls and the important parameters. Good for troubleshooting network problems.

Trace level **9** (DETAIL): All details, for example, also timers.

CAR

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): registers the messages of other components and any messages sent. returns the digit analysis result of a specific station number for IP trunking.

Trace level **6** (INTRA): returns the received data structures (call tables), the function calls and the important parameters. Good for troubleshooting problems with station number evaluation for IP trunking.

Trace level **9** (DETAIL): All details, for example, also including the contents of messages.

REG

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): registers the messages of other components and any messages sent. PSU P is used to monitor updates of nodes and digit analysis tables (call address tables) for a DB feature server.

Trace level **6** (INTRA): returns the names of received data structures, function calls and important parameters. Good for troubleshooting DB feature server update problems.

Trace level **9** (DETAIL): All details, for example, also including the contents of messages.

NS

Configured default trace level: **3** (STATUS)

Trace level **3** (INTER): registers the messages of other components and any messages sent. Good for tracing ping messages (CAR_ALIVE) via the network service.

Trace level **6** (INTRA): returns the names of received data structures, function calls and important parameters. Good for troubleshooting CAR_ALIVE problems.

Trace level **9** (DETAIL): All details, for example, also including the contents of messages.

B.1.11.2 Trace Profiles

IPTRK_SUPP_CAR_ALIVE

Profile enabled by default: **No**

Contains the following trace components:
Trace component **CAR_ALIVE**, Trace level **6**
Trace component **NS**, Trace level **3**.

Information about alive checks performed on other HG 1500 boards and about ping messages returned by the supporting network service.

IPTRK_SUPP_CAR_UPD

Profile enabled by default: **No**

Contains the following trace components:
Trace component **CAR**, Trace level **6**
Trace component **REG**, Trace level **6**.

Information about loading call address tables and about DB feature server registration and update.

IPTRK_SUPP_CAR_ALIVE

Profile enabled by default: **No**

Contains the following trace components:
Trace component **CAR**, Trace level **6**
Trace component **REG**, Trace level **3**.

Information about digit analysis of call addresses and about DB feature server registration and update.

IPTRK_OVERVIEW

Profile enabled by default: **No**

Contains the following trace components:
Trace component **CNQ**, Trace level **6**
Trace component **CAR**, Trace level **3**
Trace component **EVTLOG**, Trace level **6**
Trace component **IPNC**, Trace level **3**
Trace component **LLC_CALL**, Trace level **3**
Trace component **LLC_H245**, Trace level **3**
Trace component **LLC_Q931**, Trace level **3**
Trace component **MPH**, Trace level **3**
Trace component **NU**, Trace level **3**

Overview of the IP trunking Msg Flow. Important information is shown regarding CorNet IP Msg types and Msd types. This profile does not have a serious impact on system performance.

IPTRK_DETAILS

Profile enabled by default: **No**

Contains the following trace components:
Trace component **CNQ**, Trace level **6**
Trace component **CAR**, Trace level **3**
Trace component **EVTLOG**, Trace level **6**
Trace component **IPNC**, Trace level **6**

Trace component **LLC_CALL**, Trace level **6**
Trace component **LLC_H245**, Trace level **6**
Trace component **LLC_LINK**, Trace level **6**
Trace component **LLC_Q931**, Trace level **6**
Trace component **MPH**, Trace level **6**
Trace component **NU**, Trace level **6**

Details for IP trunking Msg Glow.Details are shown on all interfaces (This Profile has an impact on system performance)

B.1.12 H.323 trace

B.1.12.1 Trace Components

H323

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): general information.

Trace level **3** (INTER): receipt of dispatcher messages, admin recipient.

Trace level **6** (INTRA): post/send messages to other components.

Trace level **9** (DETAIL): function/parameter trace.

HSA_H225_CS

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): general information, H.323 stack API errors.

Trace level **3** (INTER): callbacks that caused a message to be sent to the H.323 Protocol Manager; stack API functions that triggered a LAN message.

Trace level **6** (INTRA): PVT use of the H.323 stack.

Trace level **9** (DETAIL): function/parameter trace.

HSA_H225_RAS

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): general information.

Trace level **3** (INTER): callbacks that caused a message to be sent to the H.323 Protocol Manager; stack API functions that triggered a LAN message.

Trace level **6** (INTRA): only used in exceptional situations.

Trace level **9** (DETAIL): function/parameter trace.

HSA_H245

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): general information.

Trace level **3** (INTER): callbacks that caused a message to be sent to the H.323 Protocol Manager; stack API functions that triggered a LAN message.

Trace level **6** (INTRA): callbacks that only collect parameter information.

Trace level **9** (DETAIL): function/parameter trace.

HSA_SYSTEM

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS), trace level **3** (INTER), trace level **6** (INTRA), trace level **9** (DETAIL): configuration and startup issues as well as information unrelated to the protocol.

HSA_NSD

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER), trace level **6** (INTRA): non-standard data traces.

HSA_RV_LOG

Configured default trace level: **6** (DETAIL)

Trace level **6** (INTRA): logging of RADVision stack traces.

PERFM_SIG

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): performance trace for the signalling part.

CFG_H235

Configured default trace level: **0** (STATUS)

CFG_H323

Configured default trace level: **0** (STATUS)

CFG_H323I

Configured default trace level: **0** (STATUS)

CFG_CODECS

Configured default trace level: **0** (STATUS)

CFG_H323GWI

Configured default trace level: **0** (STATUS)

CFG_H323GKI

Configured default trace level: **0** (STATUS)

H323_GLOBAL_SI_DOWNLOADS

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): download data trace.

CFG_H235

Configured default trace level: **0** (STATUS)

RTPQM

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): "Fallback on SCN" function trace.

Trace level **3** (INTER): "Fallback on SCN" function trace.

Trace level **6** (INTRA): "Fallback on SCN" function trace.

Trace level **9** (DETAIL): "Fallback on SCN" function trace.

SUSY_CCE

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Information trace:

Trace level **3** (INTER): Interaction with other components.

Trace level **6** (INTRA): Interaction with CCE.

Trace level **9** (DETAIL): All other actions.

B.1.12.2 Trace Profiles

H323_OVERVIEW

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **HSA_SYSTEM**, Trace level **3**
Trace component **H323**, Trace level **3**
Trace component **LLC_H245**, Trace level **3**
Trace component **LLC_Q931**, Trace level **3**
Trace component **SSM**, Trace level **3**.

Default profile for monitoring H.323 core components.

H323_DEVICE_CONTROL

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **HSA_SYSTEM**, Trace level **9**
Trace component **HSA_H225_RAS**, Trace level **9**
Trace component **H323**, Trace level **3**
Trace component **ERH**, Trace level **3**.

Default profile for detailed monitoring of the device control of the H.323 core components.

H323_CALL_CONTROL

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **HSA_SYSTEM**, Trace level **9**
Trace component **HSA_H225_CS**, Trace level **9**
Trace component **HSA_H245**, Trace level **9**
Trace component **H323**, Trace level **9**
Trace component **LLC_CALL**, Trace level **3**
Trace component **LLC_H245**, Trace level **3**
Trace component **LLC_Q931**, Trace level **3**
Trace component **SSM**, Trace level **3**.

Default profile for detailed monitoring of call control of the H.323 core components. Call control also includes media aspects.

H323_TRUNKING_SIGNALLING

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **H323**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **CNQ**, trace level **3**.

Profile used to trace problems with a H.323 line call. Suitable for initial analysis.

H323_TRUNKING_DETAIL_SIG

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **H225_CS**, trace level **6**
Trace component **H245**, trace level **6**
Trace component **HSA_SYSTEM**, trace level **6**
Trace component **H323**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **SCNPAY**, trace level **3**
Trace component **CNQ**, trace level **3**
Trace component **SPL**, trace level **3**.

Profile for a more detailed trace for signaling problems with a H323 line call. Should only be used for analyzing single calls.

H323_TRUNKING_PAYLOAD

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **H323**, trace level **9**
Trace component **SCNPAY**, trace level **3**
Trace component **CNQ**, trace level **3**
Trace component **SPL**, trace level **9**
Trace component **DEVMGR**, trace level **3**
Trace component **MSC**, trace level **0**.

This trace profile should be used for payload problems with a H.323 line call. It should only be used for analyzing single calls.

H323_ANALYSIS_STARTUP

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **HSA_SYSTEM**, trace level **9**
Trace component **H323**, trace level **9**.

This trace profile should be enabled when events are being logged for the sub-system HSA_SYSTEM or when there are indications of an incorrect configuration or that the H.323 protocol is not starting correctly.

H323_ANALYSIS_CALL

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **HSA_SYSTEM**, trace level **9**
Trace component **HSA_H225_CS**, trace level **9**
Trace component **HSA_245**, trace level **9**
Trace component **H323**, trace level **9**.

This trace profile should be enabled when call-related events are logged for H.323 protocol components. It should only be used for analyzing single calls.

H323_RAS_SIGNALLING

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **HSA_SYSTEM**, trace level **6**
Trace component **HSA_H225_RAS**, trace level **6**
Trace component **SSM**, trace level **3**
Trace component **CNQ**, trace level **3**.

Profile used to trace RAS signalling problems. Suitable for initial analysis.

H323_RAS_SIGNALLING_DETAIL

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **HSA_H225_RAS**, trace level **9**

Trace component **HSA_SYSTEM**, trace level **6**
Trace component **SSM**, trace level **3**
Trace component **CNQ**, trace level **3**.

Profile used to get a more detailed trace for RAS signalling problems.

H323_ADMIN

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **CFG_CODECS**, trace level **9**
Trace component **CFG_H323**, trace level **9**
Trace component **CFG_H323**I, trace level **9**
Trace component **CFG_GKI**, trace level **9**
Trace component **CFG_GWI**, trace level **9**
Trace component **H323_GLOBAL_SI_DOWNLOADS**, trace level **9**.

Profile used to trace detailed information required for the administration of the H.323 protocol.

H235_OVERVIEW

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **HSA_SYSTEM**, Trace level **3**
Trace component **CFG_H235**, Trace level **3**
Trace component **H323**, Trace level **3**
Trace component **LLC_H245**, Trace level **3**
Trace component **LLC_Q931**, Trace level **3**
Trace component **SSM**, Trace level **3**.

Default security profile for monitoring H.235 core components.

H235_DETAILS

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **HSA_SYSTEM**, Trace level **3**
Trace component **CFG_H235**, Trace level **9**
Trace component **H323**, Trace level **3**
Trace component **LLC_H245**, Trace level **3**
Trace component **LLC_Q931**, Trace level **3**
Trace component **SSM**, Trace level **3**.

Default security profile for detailed monitoring of H.235 core components.

CCE overview

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **HSA_SYSTEM**, trace level **6**
Trace component **CCE**, trace level **3**
Trace component **QDC**, trace level **3**

Profile to get an overview of CNQ container encryption.

CCE Details

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **3**
Trace component **HSA_SYSTEM**, trace level **9**
Trace component **HSA_H225_CS**, trace level **9**
Trace component **CCE**, trace level **9**
Trace component **QDC**, trace level **9**

Profile to get more details about CNQ container encryption.

H323_CLIENT_SIGNALLING

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **H323**, Trace level **3**
Trace component **SSM**, Trace level **3**

Profile to get more details about CNQ container encryption.

H323_CLIENT_DETAIL_SIG

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **H225_CS**, Trace level **6**
Trace component **H245**, Trace level **6**
Trace component **HSA_SYSTEM**, Trace level **6**
Trace component **H323**, Trace level **3**
Trace component **SSM**, Trace level **3**

Trace component **SCNPAY**, Trace level **3**
Trace component **DSS1**, Trace level **3**
Trace component **SPL**, Trace level **3**

Profile used to get a more detailed trace for signaling problems of a H323 client call. It should only be used for the analysis of single calls.

H323_CLIENT_PAYLOAD

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **3**
Trace component **H323**, Trace level **9**
Trace component **SCNPAY**, Trace level **3**
Trace component **CNQ**, Trace level **9**
Trace component **SPL**, Trace level **3**
Trace component **DEVMGR**, Trace level **0**

Profile should be used to trace payload problems of a H323 client call. It should only be used for the analysis of single calls.

B.1.13 Device Manager Trace

B.1.13.1 Trace Components

DEVMGR

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): shows CP interface functions for call setup and errors.

LAN

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): shows various normal operation procedures and errors.

Trace level **6** (INTRA): Displays interface functions with important parameters.

Trace level **9** (DETAIL): shows detailed information.

SCN

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): shows various normal operation procedures and errors.

Trace level **6** (INTRA): Displays interface functions with important parameters.

Trace level **9** (DETAIL): shows detailed information.

IFTABLE

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): shows errors.

Trace level **6** (INTRA): shows function calls with important parameters.

Trace level **9** (DETAIL): Not used.

B.1.13.2 Trace Profiles

DEVMGR-Startup

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DEVMGR**, trace level **6**
Trace component **IFTABLE**, trace level **6**.

Shows information about starting the Device Manager and the IF table configuration.

DEVMGR-CP

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DEVMGR**, trace level **3**.

Shows the interface functions for setting up connections and call release.

DEVMGR-Overview

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DEVMGR**, trace level **3**
Trace component **LAN**, trace level **6**
Trace component **SCN**, trace level **6**.

Displays interface functions with important parameters.

B.1.14 LDAP Trace

B.1.14.1 Trace Components

LDAP

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): list of header data for all messages sent via the dispatcher. List of messages sent and received via socket. This impacts system performance. This trace level is useful for getting an overview.

Trace level **6** (INTRA): This has a strong impact on system performance.This trace level should only be set if message details are required.

Trace level **9** (DETAIL): This has a strong impact on system performance. To be used for problems with the logical message queue, with incorrect handling of component messages and with internal software problems. To be used, for instance, with undefined LDAP messages or with incorrect or unregistered message type when posting/sending.

B.1.14.2 Trace Profiles

None.

B.1.15 LANLeg Controller Trace (LLC)

B.1.15.1 Trace Components

LLC_CALL

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors, information traces.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

LLC_Q931

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors, information traces.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

LLC_H245

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors, information traces.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

LLC_LINK

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors, information traces.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

B.1.15.2 Trace Profiles

None.

B.1.16 Media-Payload-Handler-Trace (MPH)

B.1.16.1 Trace Components

Media_Payload_Handler

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): start and end. Errors received from other components.

Trace level **3** (INTER): messages received and sent with ID parameters (such as, Resource ID, CallLeg ID). Function entries and exits.

Trace level **6** (INTRA): function-specific information.

Trace level **9** (DETAIL): function-specific information with data (for example, MPH message content).

B.1.16.2 Trace Profiles

None.

B.1.17 SNTPS trace

B.1.17.1 Trace Components

SUSY_IPSTACK_SNTPS

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): Software errors and status of parameters and internal variables.

B.1.18 HIP Trace

B.1.18.1 Trace Components

GWHIP

Configured default trace level: **3** (INTER)

Trace level **0** (STATUS): not used.

Trace level **3** (INTER): standard trace level for tracing functional sequence within and between the HIP function blocks.

Trace level **6** (INTRA): not used.

Trace level **9** (DETAIL): not used.

IPSTACK_HIP_IF

Configured default trace level: **3** (INTER)

Trace level **0** (STATUS): not used.

Trace level **3** (INTER): standard trace level for viewing the configuration of the HIP interface to the IP stack.

Trace level **6** (INTRA): not used.

Trace level **9** (DETAIL): not used.

B.1.18.2 Trace Profiles

HIP Standard

Profile enabled by default: **No**

Contains the following trace components:
Trace component **GWSI**, trace level **3**
Trace component **GWHIP**, trace level **3**.

Standard trace profile for HIP (proxy IP access for HiPath 3000).

B.1.19 DS Adapter Trace

B.1.19.1 Trace Components

DSA

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors that should not normally occur. Information.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

B.1.19.2 Trace Profiles

LL_H323CallOverview

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, trace level **9**
Trace component **SSM**, trace level **3**
Trace component **DSA**, trace level **3**
Trace component **IPNC**, trace level **3**
Trace component **LLC_CALL**, trace level **3**
Trace component **LLC_H245**, trace level **3**
Trace component **LLC_LINK**, trace level **3**
Trace component **LLC_Q931**, trace level **3**
Trace component **H323**, trace level **3**
Trace component **MPH**, trace level **3**.

Overview profile for incoming and outgoing basic H.323 calls and associated message flow.

LL_H323CallDetails

Profile enabled by default: **No**

Contains the following trace components:
Trace component **EVTLOG**, Trace level **9**
Trace component **DEVMGR**, Trace level **6**
Trace component **DSS1**, Trace level **6**
Trace component **SSM**, Trace level **6**
Trace component **DSA**, Trace level **9**
Trace component **IPNC**, Trace level **9**
Trace component **LLC_CALL**, Trace level **8**
Trace component **LLC_H245**, Trace level **8**
Trace component **LLC_LINK**, Trace level **8**
Trace component **LLC_Q931**, Trace level **8**
Trace component **HSA_H225_CS**, Trace level **6**
Trace component **H323**, Trace level **6**
Trace component **MPH**, Trace level **3**
Trace component **MSC**, Trace level **0**.

Detailed information about incoming and outgoing basic H.323 calls and for the associated message flow.

B.1.20 Endpoint Registration Handler (ERH) Trace

B.1.20.1 Trace Components

ERH_REGISTRATION

ERH: H.225 RAS for registration trace of H225RRQ, H225RCF, H225RRJ, H225URQ, H225UCF, H225URJ, SI call number registration, HFA logon/logoff.

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors that should not normally occur. Information.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

ERH_ADMISSION

ERH: H.225 RAS for permit trace of H225ARQ, H225ACF, H225ARJ, H225DRQ, H225DCF, H225DRJ, H235CheckPeer and LLC interfaces.

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors that should not normally occur. Information.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

ERH_CONFIGURATION

ERH: admin receiver and start, configuration of TomSec trace of RAS server start/stop/ack, admin receiver (ERH), listen admin receiver (CAR_NODE_TAB), H235AddPeer and H235DeletePeer.

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): internal software errors that should not normally occur. Information.

Trace level **3** (INTER): sent and received messages.

Trace level **6** (INTRA): internal message flow.

Trace level **9** (DETAIL): function entries and statuses of internal variables.

B.1.20.2 Trace Profiles

ERH is added to some H323 trace profiles (see Section B.1.12.2) with the component **ERH_ADMISSION** for further evaluation.

B.1.21 IPsec Trace

B.1.21.1 Trace Components

IPSEC

Configured default trace level: **6** (INTRA)

Trace level **0** (STATUS): log events from the IPsec stack with the types "Warning", "Minor", "Major" and "Critical" or if an audit text string exceeds 255 characters.

Trace level **3** (INTER): summary information about IKE protocol negotiations is created.

Trace level **6** (INTRA): detailed information about IKE protocol negotiations is created.

Trace level **7**: tracing of packet losses in the IPsec engine.

Trace level **8**: traces are also performed for start and end points of packet flows (`SESSION_START` or `SESSION_END`).

B.1.21.2 Trace Profiles

None.

B.1.22 SW Platform Trace

B.1.22.1 Trace Components

IPSTACK_NAT

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): initialization.

Trace level **6** (INTRA): detailed information about NAT processing.

Trace level **9** (DETAIL): translated data.

IP_FILTER

Trace level **3** (INTER): Packet/Direction.

Trace level **6** (INTRA): decision: Next (pass)/Delete

Trace level **9** (DETAIL): Show rule to be used as a basis for making the decision.

MAC_FILTER

Trace level **3** (INTER): Packet/Direction.

Trace level **6** (INTRA): decision: Next (pass)/Delete

Trace level **9** (DETAIL): Show rule to be used as a basis for making the decision.

TESTLW

Configured default trace level: **0** (STATUS)

Trace level **0**-9: Detailed information about TESTLW actions – for developers only.

MSP_HDLC

Configured default trace level: **0** (STATUS)

Trace level **0-9**: Detailed information about HDLC driver actions – for developers only.

MSC_QM

Trace level **3** (INTER): Information about quality surveillance

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): Detailed information about all MSC functions
(only in RTCP context).

DSP

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Not used

Trace level **3-9**: Displayed messages issued by the DSP and the DSB driver.

MSP_RTP_MOD

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Not used

Trace level **3-9**: Internal messages from the RTP module.

MAT_STREAM

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Not used

Trace level **3-9**: internal messages from Materna memory management.

STREAMS

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Not used

Trace level **3-9**: internal messages from Streams memory management.

PPTP_PROC

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): Detailed information about MSC specific quality data

Trace level 3 (INTER): information about call setup/release on the PPP manager interface

PPTP_DBG_IF

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Not used

Trace level **3-9**: internal error messages from the PPTP for debugging.

PPPOE_PROC

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): information about call setup/release on the PPP Manager interface.

Trace level **9** (DETAIL): Detailed information about MSC-specific quality data.

PPPOE_DBG_IF

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Not used

Trace level **3-9**: internal error messages from the PPTP for debugging.

PPP_STACK_DBG_IF

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): PPP stack internal error messages.

Trace level **6**-**9**: Further detailed information about call setup/call release.

PPP_STACK_PROC

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): status of PPP call setup/release.

Trace level **6**-**9**: PPP stack of internal program flows.

PPPM_TBAS

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): PPP MANAGER: Base configuration and status information, abnormal conditions.

Trace level **6**-**9**: PPP transfer phase.

PPPM_TSTD

Configured default trace level: **0** (STATUS)

Trace level **3**-**9**: Internal message flow of PPP manager.

PPPM_TEXT

Configured default trace level: **0** (STATUS)

Trace level **3**-**9**: Extended information about internal PPP Manager proceedings

SOH

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): status information through to detailed information about internal SOH. For developers only.

IPSTACK

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): error situation in IP Accounting hash functions. For developers only.

IPSTACK_GLOBAL

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): handling of config data.

IPSTACK_ROUTE

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): error situation in routing data.

IPSTACK_1LAN_IF

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): handling of config data.

IPSTACK_2LAN_IF

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): handling of config data.

FAXCONVERTER

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about Fax Converter routines and data flow interface actions. For developers only.

FAXCONV_T30UP

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about upstream interface actions associated with the Fax Converter T.30 module. For developers only.

FAXCONV_T30DOWN

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about downstream interface actions associated with the Fax Converter T.30 module. For developers only.

FAXCONV_T30INT

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about Fax Converter T.30 module actions. For developers only.

FAXCONV_IF

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about Fax Converter CAPI interface actions. For developers only.

FAXCONV_OS

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about Fax Converter OS interface actions. For developers only.

FAXCONV_LOGT

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Customer trace displaying bad fax transmissions.

T90

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about T.90 protocol actions. For developers only.

X75

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about X.75 protocol actions. For developers only.

X25

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about X.25 protocol actions. For developers only.

DELIC_DRIVER

Configured default trace level: **0** (STATUS)

Trace level **0-9**: status information through to detailed information about the DELIC driver (SWC). For developers only.

ASP

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): information about call setup/release.

Trace level **9** (DETAIL): detailed information about MSP call setup/release (except DSP-DD).

MSP_CAPI_IF

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): not used.

Trace level **3-9**: internal messages from the CAPI interface driver.

MSP_PPP_IF

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): not used.

Trace level **3-9**: internal messages from the PPP interface driver.

ASP_DSP_IOCTL

Configured default trace level: **0** (STATUS)

Trace level **9** (DETAIL): more detailed information about call setup/release (with all parameters).

ASP_DSP_EVENT

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): information about detected DTMF, fax or modem.

ASP_DSP_STAT

Configured default trace level: **0** (STATUS)

Trace level **6** (INTRA): information about data channel configuration after call setup (fax, modem, V.110).

MSC

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): API to Magic (function calls with parameters).

Trace level **3** (INTER): I/O controls for the MSP will also be traced.

Trace level **6** (INTRA): tracing of internal MSC functions and handles/file descriptors.

Trace level **9** (DETAIL): settings for configuration parameters (MSC, MSP/DSP) are traced. Detailed information about all MSC functions.

MSC_TMT

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): MSC functions called by Magic will be traced.

Trace level **6** (INTRA): all I/O controls (interface to MSP) will be traced.

MSC_RTCP

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): general information about RTCP session, timer, etc.

Trace level **3** (INTER): callback function from MSP concerning RTCP events.

Trace level **6** (INTRA): internal functions called during RTCP session.

Trace level **9** (DETAIL): detailed information about all MSC functions (only in RTCP context).

B.1.22.2 Trace Profiles

PPPISDNCall

Profile enabled by default: **No**

Contains the following trace components:
Trace component **PPPCC**, trace level **3**
Trace component **PPPM_TBAS**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **SPL**, trace level **3**
Trace component **MSC**, trace level **6**
Trace component **PPP_STACK_PROC**, trace level **6**
Trace component **PPP_DBG_IF**, trace level **3**.

Standard trace profile for problems with establishment/termination of PPP connections via ISDN including PPP stack handling.

PPPModemCall

Profile enabled by default: **No**

Contains the following trace components:
Trace component **PPPCC**, trace level **3**
Trace component **PPPM_TBAS**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **SPL**, trace level **3**
Trace component **MSC**, trace level **6**
Trace component **PPP_STACK_PROC**, trace level **6**
Trace component **PPP_DBG_IF**, trace level **3**.

Standard trace profile for problems with setup/release of PPP connections via modem including PPP stack handling.

ISPAccessISDN

Profile enabled by default: **No**

Contains the following trace components:
Trace component **PPPCC**, trace level **3**
Trace component **PPPM_TBAS**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **SPL**, trace level **3**
Trace component **MSC**, trace level **6**
Trace component **PPP_STACK_PROC**, trace level **6**
Trace component **PPP_DBG_IF**, trace level **3**.

Trace profile for problems with setup/release of PPP connections to the Internet Service Provider (ISP) via ISDN including PPP stack handling.

ISPAccessModem

Profile enabled by default: **No**

Contains the following trace components:
Trace component **PPPCC**, trace level **3**
Trace component **PPPM_TBAS**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **SPL**, trace level **3**
Trace component **MSC**, trace level **6**
Trace component **PPP_STACK_PROC**, trace level **6**
Trace component **PPP_DBG_IF**, trace level **3**.

Trace profile for problems with setup/release of PPP connections to the Internet Service Provider (ISP) via Modem including PPP stack handling.

ISPAccessPPPPoE

Profile enabled by default: **No**

Contains the following trace components:
Trace component **PPPM_TBAS**, trace level **3**
Trace component **PPPOE_PROC**, trace level **3**
Trace component **PPP_STACK_PROC**, trace level **6**
Trace component **PPP_DBG_IF**, trace level **3**.

Trace profile for problems with setup/release of PPP connections to the Internet Service Provider (ISP) via PPPPoE including PPP stack handling.

ISPAccessPPTP

Profile enabled by default: **No**

Contains the following trace components:
Trace component **PPPM_TBAS**, trace level **3**
Trace component **PPTP_PROC**, trace level **3**
Trace component **PPP_STACK_PROC**, trace level **6**
Trace component **PPP_DBG_IF**, trace level **3**.

Trace profile for problems with setup/release of PPP connections to the Internet Service Provider (ISP) via PPTP including PPP stack handling.

H323VoiceCall

Profile enabled by default: **No**

Contains the following trace components:
Trace component **H323**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **DSS1**, trace level **3**
Trace component **SI**, trace level **3**
Trace component **MSC**, trace level **6**.

Trace profile for problems with H.323 call setup/release within MSC/MSP.

HFAVoiceCall

Profile enabled by default: **No**

Contains the following trace components:
Trace component **IPNC**, trace level **3**
Trace component **HFAM**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **DSS1**, trace level **3**
Trace component **SI**, trace level **3**
Trace component **MSC**, trace level **6**.

Trace profile for problems with HFA call setup/release within MSC/MSP.

IPTrunkVoiceCall

Profile enabled by default: **No**

Contains the following trace components:
Trace component **IPNC**, trace level **3**
Trace component **SI**, trace level **3**
Trace component **SSM**, trace level **3**
Trace component **NU**, trace level **3**
Trace component **SPL**, trace level **3**
Trace component **MSC**, trace level **6**.

Trace profile for problems with trunk-based call setup/release within MSC/MSP.

ToneProcessing

Profile enabled by default: **No**

Contains the following trace components:
Trace component **SSM**, trace level **3**
Trace component **DSS1**, trace level **3**
Trace component **MSC**, trace level **6**
Trace component **ASP_DSP_EVENT**, trace level **3**.

Trace profile for problems with tone processing (for example, DTMF).

T30_38_FAX_CON

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DELIC_DRIVER**, Trace level **6**
Trace component **MSC**, Trace level **6**
Trace component **ASP_DSP_EVENT**, Trace level **3**
Trace component **ASP_DSP_IOCTL**, Trace level **3**
Trace component **BSD44_PROC**, Trace level **3**
Trace component **VCAPI_DISP**, Trace level **3**
Trace component **VCAPI**, trace level **6**
Trace component **CAPIMGR**, Trace level **6**
Trace component **FAXCONVERTER**, trace level **6**
Trace component **FAXCONV_T30UP**, Trace level **9**
Trace component **FAXCONV_T30INT**, Trace level **6**
Trace component **FAXCONV_T30DOWN**, Trace level **9**
Trace component **FAXCONV_IF**, Trace level **6**
Trace component **FAXCONV_LOGT**, Trace level **0**.

Trace profile for problems with the setup and release of fax connections in the B channel.

T30_38_FAX_XFER

Profile enabled by default: **No**

Contains the following trace components:
Trace component **ASP_DSP_EVENT**, Trace level **6**
Trace component **ASP_DSP_IOCTL**, Trace level **3**
Trace component **BSD44_PROC**, Trace level **3**
Trace component **VCAPI_DISP**, Trace level **3**
Trace component **VCAPI**, Trace level **3**
Trace component **CAPIMGR**, Trace level **3**
Trace component **FAXCONVERTER**, Trace level **9**
Trace component **FAXCONV_T30UP**, Trace level **5**
Trace component **FAXCONV_T30INT**, Trace level **9**
Trace component **FAXCONV_T30DOWN**, Trace level **5**
Trace component **FAXCONV_IF**, Trace level **5**
Trace component **FAXCONV_OS**, Trace level **8**
Trace component **FAXCONV_LOGT**, Trace level **0**.

Trace profile for problems with the transfer of a fax document in the B channel.

T90_CON

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DELIC_DRIVER**, trace level **6**
Trace component **MSP_HDLC**, trace level **6**
Trace component **BSD44_PROC**, trace level **3**
Trace component **VCAPI_DISP**, trace level **3**
Trace component **VCAPI**, trace level **6**
Trace component **CAPIMGR**, trace level **6**
Trace component **X75**, trace level **3**
Trace component **T90**, trace level **6**.

Trace profile for problems with the setup and release of a fax connection in the B channel.

T90_XFER

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DELIC_DRIVER**, trace level **6**
Trace component **MSP_HDLC**, trace level **6**
Trace component **BSD44_PROC**, trace level **3**
Trace component **VCAPI_DISP**, trace level **3**
Trace component **VCAPI**, trace level **3**
Trace component **CAPIMGR**, trace level **3**
Trace component **X75**, trace level **3**
Trace component **T90**, trace level **9**.

Trace profile for problems with data transfer over a T.90 connection in the B channel.

X25_CON

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DELIC_DRIVER**, trace level **6**
Trace component **MSP_HDLC**, trace level **6**
Trace component **BSD44_PROC**, trace level **3**
Trace component **VCAPI_DISP**, trace level **3**
Trace component **VCAPI**, trace level **6**
Trace component **CAPIMGR**, trace level **6**
Trace component **X75**, trace level **3**
Trace component **T25**, trace level **6**.

Trace profile for problems with the setup and release of an X.25 connection in the B channel.

X25_XFER

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DELIC_DRIVER**, trace level **6**
Trace component **MSP_HDLC**, trace level **6**
Trace component **BSD44_PROC**, trace level **3**
Trace component **VCAPI_DISP**, trace level **3**
Trace component **VCAPI**, trace level **3**
Trace component **CAPIMGR**, trace level **3**
Trace component **X75**, trace level **3**
Trace component **T25**, trace level **9**.

Trace profile for problems with data transfer over an X.25 connection in the B channel.

X75_CON

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DELIC_DRIVER**, trace level **6**
Trace component **MSP_HDLC**, trace level **6**
Trace component **BSD44_PROC**, trace level **3**
Trace component **VCAPI_DISP**, trace level **3**
Trace component **VCAPI**, trace level **6**
Trace component **CAPIMGR**, trace level **6**
Trace component **X75**, trace level **6**.

Trace profile for problems with the setup and release of an X.75 connection in the B channel.

X75_XFER

Profile enabled by default: **No**

Contains the following trace components:
Trace component **DELIC_DRIVER**, trace level **6**
Trace component **MSP_HDLC**, trace level **6**
Trace component **BSD44_PROC**, trace level **3**
Trace component **VCAPI_DISP**, trace level **3**
Trace component **VCAPI**, trace level **3**
Trace component **CAPIMGR**, trace level **3**
Trace component **X75**, trace level **9**.

Trace profile for problems with data transfer over an X.75 connection in the B channel.

B.1.23 DLI trace

B.1.23.1 Trace Components

SUSY_DLI_WORKPOINT

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): Initialization and registration.

Trace level **6** (INTRA): Message flow between telephone and DLI.

Trace level **9** (DETAIL): Important functions and status of important variables.

SUSY_DLI_SOFTWARE

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): Information about loaded and deleted software. Setting the status flag.

Trace level **6** (INTRA): Information about internal message flow.

Trace level **9** (DETAIL): Important functions and status of important variables.

B.1.23.2 Trace Profiles

None

B.1.24 P2P trace

B.1.24.1 Trace Components

SUSY_P2P

Configured default trace level: **0** (STATUS)

Trace level **3** (INTER): Message exchange

Trace level **6** (INTRA): Internal message flow

Trace level **9** (DETAIL): Function input/Status of important variables

B.1.25 QDC trace

B.1.25.1 Trace Components

QDC

Configured default trace level: **0**

Trace level **0**: Status information about the QDC client; Traces are only displayed once
- Information about startup/shutdown of the QDC client
- Informs whether the transmission to the QCU/NetMgr has been started or canceled

Trace level **3**: Highest-level execution flow diagrams and error messages.

Trace level **6**: Execution flow diagrams
- Traces are displayed when a function or class method is entered.

Trace level **9**: Detailed information about internal and interface data
- Buffer content, e.g. QoS report from the MSC/to the QCU
- Interface data

B.1.25.2 Trace Profiles

QdcOverview

Profile enabled by default: **No**

Contains the following trace components:

Trace component **QDC**, Trace level **3**
Trace component **MSC_QM**, Trace level **3**

Shows the workflow within QoS Data Collection

OdcDetails

Profile enabled by default: **No**

Contains the following trace components:

Trace component **QDC**, Trace level **6**
Trace component **MSC_QM**, Trace level **6**

Shows the workflow within QoS Data Collection.

OdcData

Profile enabled by default: **No**

Contains the following trace components:

Trace component **QDC**, Trace level **9**
Trace component **MSC_QM**, Trace level **9**

Representation of the content of data structures and internal data; this profile affects system performance.

B.1.26 SIP_FM trace (SIP feature manager)

B.1.26.1 Trace Components

SIP_FM

Configured default trace level: **3**

Trace level **0**: Not used.

Trace level **3**: External interfaces of the SIP feature manager.

Trace level **6**: External and internal interfaces of the SIP feature manager.

Trace level **9**: External and internal interfaces and details of the processing method within the SIP feature manager.

B.1.26.2 Trace Profiles

SIP_FM-Std

Profile enabled by default: **No**

Contains the following trace components:

Trace component **SIP_FM**, Trace level **3**
Trace component **SIP**, Trace level **3**
Trace component **ISDN_FM**, Trace level **3**
Trace component **DSS1**, Trace level **3**

Standard trace profiles for problems with SIP functions ((Call) hold, Return, Transfer)

B.1.27 SIP trace

B.1.27.1 Trace Components

SUSY_SIP

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Information trace

Trace level **3** (INTER): Receipt of dispatcher messages, admin recipient

Trace level **9** (DETAIL): Function/parameter trace

SUSY_SIP_CFG

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Information trace

Trace level **3** (INTER): Receipt of dispatcher messages, admin recipient

Trace level **9** (DETAIL): Function/parameter trace

SUSY_SIP_CFG_INT

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Information trace

Trace level **3** (INTER): Receipt of dispatcher messages, admin recipient

Trace level **9** (DETAIL): Function/parameter trace

SUSY_CFG_CODECS

Configured default trace level: **0** (STATUS)

Trace Level: N/A

SUSY_SIP_SA

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Information trace

Trace level **3** (INTER): Receipt of dispatcher messages, admin recipient

Trace level **9** (DETAIL): Function/parameter trace

SUSY_SIP_REG

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Information trace

Trace level **3** (INTER): Receipt of dispatcher messages, admin recipient

Trace level **9** (DETAIL): Function/parameter trace

SUSY_SIP_HT

Configured default trace level: **0** (STATUS)

Trace level **0** (STATUS): Information Traces (startup/shutdown)

Trace level **3** (INTER): MsgVisu trace (HiPath 3000/5000 V8 - HG 1500 V8 tool); Plausibility check trace

Trace level **6** (INTRA): Function trace

Trace level **9** (DETAIL): Parameter trace

B.1.27.2 Trace Profiles

None

B.2 Events

The sections below reflect the content of the original event templates.

An event type is assigned to each event. The following event types are available:

- **Information:** status message only, not an error message.
- **Warning:** message indicating a procedure or status that may be problematic; not an error message.
- **Minor:** error message. However, the error is not causing problems.
- **Major:** error message. This error could cause problems.
- **Critical:** error message. This error causes problems.
- **Cleared:** error message. The error has already been cleared by the system.
- **Indeterminate:** error message. The exact cause of the error cannot be established.

The descriptions contain the following information about each event:

- the event code,
- the message text in the log entry or at the user interface,
- the event type (see above),
- clarification of the causes, system responses and, if applicable, possible troubleshooting measures.

Some message texts (event texts) contain variable data. These are indicated as follows:

- `%s` means: character string
- `%d` and `%I` mean: positive decimal number
- `%u` means: positive or negative decimal number
- `%f` means: floating point number
- `%p` means: pointer (memory address)
- `%x` means: hexadecimal number (using lowercase letters)
- `%X` means: hexadecimal number (using uppercase letters)
- `%c` means: single character

B.2.1 Overview: Event Codes

The table is intended to help you find specific status and error messages faster. It has been sorted alphabetically according event codes. For all event codes beginning with `MSG_`, sorting effectively starts with the 5th character.

Event Code	Section
ASSERTION_FAILED_EVENT	B.2.3, „Reboot Events“
CCE_GENERAL_ERROR	B.2.49, „LAN signaling events – CCE“
CCE_PSS_STORE_ERROR	B.2.49, „LAN signaling events – CCE“
EXIT_REBOOT_EVENT	B.2.3, „Reboot Events“
FP_EVT_CRITICAL	B.2.3, „Reboot Events“
FP_EVT_INDETERMINATE	B.2.2, „Status Events“
FP_EVT_MAJOR	B.2.3, „Reboot Events“
FP_EVT_MINOR	B.2.2, „Status Events“
FP_EVT_SNMP_TRAP	B.2.2, „Status Events“
FP_EVT_INFORMATION	B.2.2, „Status Events“
FP_EVT_TRACE_START	B.2.2, „Status Events“
FP_EVT_TRACE_STOP	B.2.2, „Status Events“
FP_EVT_WARNING	B.2.3, „Reboot Events“
MSG_ADMIN_DIDNT_GET_WRITE_ACCESS	B.2.28, „OAM Events“

Event Code	Section
MSG_ADMIN_FORCE_RELEASE_WRITE_ACCESS	B.2.28, „OAM Events“
MSG_ADMIN_GOT_WRITE_ACCESS	B.2.28, „OAM Events“
MSG_ADMIN_INVALID_LOGIN	B.2.28, „OAM Events“
MSG_ADMIN_LOGGED_IN	B.2.28, „OAM Events“
MSG_ADMIN_LOGGED_OUT	B.2.28, „OAM Events“
MSG_ADMIN_REBOOT	B.2.3, „Reboot Events“
MSG_ADMIN_RELEASED_WRITE_ACCESS	B.2.28, „OAM Events“
MSG_ADMIN_SESSION_CREATED	B.2.28, „OAM Events“
MSG_ADMIN_SESSION_EXPIRED	B.2.28, „OAM Events“
MSG_ASC_ERROR	B.2.35, „Major ASC Events“
MSG_ASP_ERROR	B.2.36, „Major ASP Events“
MSG_ASP_INFO	B.2.34, „Important Platform Software Status Events“
MSG_ASP_INFO	B.2.37, „Minor ASP Events“
MSG_BSD44_ACCEPT_DGW_ERR	B.2.12, „DGW Events“
MSG_BSD44_ACCEPT_ERROR	B.2.22, „VCAPI Events“
MSG_BSD44_DGW_BIND_FAIL	B.2.12, „DGW Events“
MSG_BSD44_DGW_CONNECT_FAIL	B.2.12, „DGW Events“
MSG_BSD44_DGW_NO_LIST	B.2.12, „DGW Events“
MSG_BSD44_DGW_SOCKET_FAIL	B.2.12, „DGW Events“
MSG_BSD44_SELECT_ERROR	B.2.22, „VCAPI Events“
MSG_BSD44_VCAPI_NO_LIST	B.2.12, „DGW Events“
MSG_CAR_ALIVE_IP_CONNECTION_LOST	B.2.13, „CAR Events“
MSG_CAR_ALIVE_IP_CONNECTION_LOST	B.2.13, „CAR Events“
MSG_CAR_ALIVE_IP_CONNECTION_OK_AGAIN	B.2.13, „CAR Events“
MSG_CAR_CALL_ADDR_REJECTED	B.2.28, „OAM Events“
MSG_CAR_CAN_NOT_ARRANGE_NODE_TAB	B.2.13, „CAR Events“
MSG_CAR_CAN_NOT_SORT_MAC_ADDRESS	B.2.13, „CAR Events“
MSG_CAR_CODEC_ENTRY_DELETED	B.2.13, „CAR Events“
MSG_CAR_CODECS_INCONSISTENT	B.2.13, „CAR Events“
MSG_CAR_DB_READ_NODE_TABLE_ERROR	B.2.13, „CAR Events“
MSG_CAR_DBF_SERVER_INCONSISTENT	B.2.13, „CAR Events“
MSG_CAR_DBFS_POSS_CONFLICT	B.2.13, „CAR Events“
MSG_CAR_ERROR_WITH_OAM_INTERFACE	B.2.13, „CAR Events“
MSG_CAR_FKT_GET_IPADR_FAILED	B.2.13, „CAR Events“
MSG_CAR_GENERAL_ERROR	B.2.13, „CAR Events“
MSG_CAR_MALLOC_FAILED	B.2.4, „Resource Monitoring Events“
MSG_CAR_NO_FREE_CODEC_TAB_ELE	B.2.13, „CAR Events“

Event Code	Section
MSG_CAR_NO_MAC_ADDRESS	B.2.13, „CAR Events“
MSG_CAR_NO_MEMORY	B.2.13, „CAR Events“
MSG_CAR_NODE_INFO_ALREADY_AVAILABLE	B.2.13, „CAR Events“
MSG_CAR_PARAM_NOT_FOUND	B.2.13, „CAR Events“
MSG_CAR_SENDING_UPDATE_REQUEST_FAILED_NO_MEMORY	B.2.13, „CAR Events“
MSG_CAR_SENDING_UPDATE_REQUEST_FAILED_SOH_ERROR	B.2.13, „CAR Events“
MSG_CAR_SOH_MESSAGE_NOT_FROM_VENUS	B.2.13, „CAR Events“
MSG_CAR_START_TCP_LISTENER_FAILED	B.2.13, „CAR Events“
MSG_CAR_UNAUTHORIZED_IP_ACCESS	B.2.13, „CAR Events“
MSG_CAR_UNEXPECTED_DATA_RECV	B.2.13, „CAR Events“
MSG_CAR_UNEXPECTED_MSG_RECV	B.2.13, „CAR Events“
MSG_CAR_UPDATE_NUMBER_OF_ENTRIES_CALLADDRTAB_TOO_BIG	B.2.13, „CAR Events“
MSG_CAR_WRONG_EVENT	B.2.13, „CAR Events“
MSG_CAR_WRONG_IP_ADDRESS	B.2.13, „CAR Events“
MSG_CAR_WRONG_LENGTH	B.2.13, „CAR Events“
MSG_CAR_WRONG_NODE_ID	B.2.13, „CAR Events“
MSG_CAR_WRONG_SERVICE	B.2.13, „CAR Events“
MSG_CAT_H235	B.2.9, „H.235 Events“
MSG_CAT_HSA_REBOOT	B.2.2, „Status Events“
MSG_CAT_NWRS	B.2.5, „Routing Events“
MSG_CLI_LOGGED_IN_FROM_TELNET	B.2.29, „CLI Events“
MSG_CLI_LOGGED_IN_FROM_V24	B.2.29, „CLI Events“
MSG_CLI_TELNET_ABORTED	B.2.29, „CLI Events“
MSG_DELIC_ERROR	B.2.41, „DELIC Events“
MSG_DEVM_BINDING_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVM_NO_PROTOCOL_FOR_DEVICE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVM_NO_PROTOCOL_FOR_DEVICE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_CAN_NOT_READ_PERSISTENCY	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_CLOSE_LEG_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_CONNECT_LEGS_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_CONNECT_WRONG_LEGS	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_CONNECT_WRONG_RES_STATE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_CREATE_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_DEVICEID_OUT_OF_RANGE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_DISCONNECT_LEGS_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_INTERROR_CHNID	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_INTERROR_DEVID	B.2.33, „MAGIC/Device Manager Events“

Event Code	Section
MSG_DEVMGR_INTERROR_RESID	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_LAYER2_SERVICE_TRAP	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_LISTEN_WRONG_RES_STATE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_MSCERROR_RESID	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_NO_DEVICE_ID_FOR_DEVICE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_NO_DEVICE_TYPE_FOR_DEVICE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_OPEN_LEG_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_OPEN_WRONG_RES_STATE	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_SCN_TASK_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DEVMGR_UPDATE_LEG_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_DGW_ABORT_SOCK_UNKN	B.2.12, „DGW Events“
MSG_DGW_ACCEPT_FAILED	B.2.12, „DGW Events“
MSG_DGW_ALLOC_CHN_CONN_FAIL	B.2.12, „DGW Events“
MSG_DGW_ALLOC_CHN_RUN_OUT	B.2.12, „DGW Events“
MSG_DGW_ALLOC_CONF_ERR	B.2.12, „DGW Events“
MSG_DGW_ALLOC_DISC_B3	B.2.12, „DGW Events“
MSG_DGW_ALLOC_REQ_ERR	B.2.12, „DGW Events“
MSG_DGW_BUFAVAIL_SOCK_UNKN	B.2.12, „DGW Events“
MSG_DGW_CONF_ALLOC_ERR	B.2.12, „DGW Events“
MSG_DGW_CONN_B3_ACT_IND	B.2.12, „DGW Events“
MSG_DGW_CONN_COMPL_ALLOC	B.2.12, „DGW Events“
MSG_DGW_CONN_OUT_OF_RANGE	B.2.12, „DGW Events“
MSG_DGW_CONN_RUN_OUT	B.2.12, „DGW Events“
MSG_DGW_CONNECT_FAILED	B.2.12, „DGW Events“
MSG_DGW_DATA_B3_ALLOC_ERR	B.2.12, „DGW Events“
MSG_DGW_DISC_B3_IND	B.2.12, „DGW Events“
MSG_DGW_DISC_B3_NOT_SEND	B.2.12, „DGW Events“
MSG_DGW_FREE_ALLOC_ERR	B.2.12, „DGW Events“
MSG_DGW_FREE_CHN_ALLOC_FAIL	B.2.12, „DGW Events“
MSG_DGW_FREE_NOT_SEND	B.2.12, „DGW Events“
MSG_DGW_FREE_UNKNOWN_ID	B.2.12, „DGW Events“
MSG_DGW_IND_ALLOC_ERR	B.2.12, „DGW Events“
MSG_DGW_INV_DATA_LEN	B.2.12, „DGW Events“
MSG_DGW_INV_MSG_LEN	B.2.12, „DGW Events“
MSG_DGW_INVALID_LENGTH	B.2.12, „DGW Events“
MSG_DGW_LISTENING_ERR	B.2.12, „DGW Events“
MSG_DGW_MGR_NOT_READY	B.2.12, „DGW Events“

Event Code	Section
MSG_DGW_MSG_IGNORED	B.2.12, „DGW Events“
MSG_DGW_MSG_RCV_FAIL	B.2.12, „DGW Events“
MSG_DGW_NO_PLCI	B.2.12, „DGW Events“
MSG_DGW_OPEN_CHN_ALLOC_FAIL	B.2.12, „DGW Events“
MSG_DGW_OPEN_CHN_UNKNOWN_ID	B.2.12, „DGW Events“
MSG_DGW_OPEN_CHN_WRONG	B.2.12, „DGW Events“
MSG_DGW_RCV_ALLOC_FAIL	B.2.12, „DGW Events“
MSG_DGW_RCV_FAILED	B.2.12, „DGW Events“
MSG_DGW_RCV_SOCK_UNKN	B.2.12, „DGW Events“
MSG_DGW_RECEIVE_ERR	B.2.12, „DGW Events“
MSG_DGW_SEC_ALLOC_FAIL	B.2.12, „DGW Events“
MSG_DGW_SEND_DATA_ERR	B.2.12, „DGW Events“
MSG_DGW_SEND_FAILED	B.2.12, „DGW Events“
MSG_DGW_SOCKET_BIND_ERR	B.2.12, „DGW Events“
MSG_DGW_SOCKET_NOT_OPEN	B.2.12, „DGW Events“
MSG_DGW_SOCKET_UNKNOWN	B.2.12, „DGW Events“
MSG_DGW_UNH_MSG_CAPI20_MGR	B.2.12, „DGW Events“
MSG_DGW_UNHANDLED_EVENT	B.2.12, „DGW Events“
MSG_DGW_UNHANDLED_MSG	B.2.12, „DGW Events“
MSG_DGW_UNKNOWN_ID_CHANNEL	B.2.12, „DGW Events“
MSG_DGW_UNKNOWN_NOTIFIC	B.2.12, „DGW Events“
MSG_DGW_UNKNOWN_PRIMITIVE	B.2.12, „DGW Events“
MSG_DGW_WRONG_EVENT_CAPI	B.2.12, „DGW Events“
MSG_DGW_WRONG_EVENT_CAPI20	B.2.12, „DGW Events“
MSG_DGW_WRONG_STATE	B.2.12, „DGW Events“
MSG_DISP_SENDER_NOT_SET	B.2.28, „OAM Events“
MSG_ERH_ADMISSION_ERROR	B.2.45, „Endpoint Registration Handler (ERH) Trace Events“
MSG_ERH_ERROR	B.2.45, „Endpoint Registration Handler (ERH) Trace Events“
MSG_ERH_INFORMATION	B.2.45, „Endpoint Registration Handler (ERH) Trace Events“
MSG_ERH_NO_LICENSE	B.2.45, „Endpoint Registration Handler (ERH) Trace Events“
MSG_ERH_REGISTRATION_ERROR	B.2.45, „Endpoint Registration Handler (ERH) Trace Events“
MSG_ERH_SECURITY_DENIAL	B.2.45, „Endpoint Registration Handler (ERH) Trace Events“
MSG_EXCEPTION_REBOOT	B.2.3, „Reboot Events“

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MSG_FAXCONV_ERROR	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_FAXCONV_INFO	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_GSA_SNMP	B.2.11, „GSA Events“
MSG_GW_OBJ_ALLOC_FAILED	B.2.3, „Reboot Events“
MSG_GW_OBJ_MEMORY_EXHAUSTED	B.2.3, „Reboot Events“
MSG_GW_OBJ_MEMORY_INCONSISTENT	B.2.3, „Reboot Events“
MSG_GW_SUCCESSFULLY_STARTED	B.2.2, „Status Events“
MSG_H323_INFORMATION	B.2.8, „H.323 Events“
MSG_H323_INVALID_CONFIGURATION	B.2.8, „H.323 Events“
MSG_H323_INVALID_PARAMETER_VALUE	B.2.8, „H.323 Events“
MSG_H323_INVALID_POINTER	B.2.8, „H.323 Events“
MSG_H323_LOGIC_ERROR	B.2.8, „H.323 Events“
MSG_H323_MISSING_PARAMETER	B.2.8, „H.323 Events“
MSG_H323_OSCAR_NSD_ERROR	B.2.8, „H.323 Events“
MSG_H323_PROTOCOL_ERROR	B.2.8, „H.323 Events“
MSG_H323_SNMP_TRAP	B.2.8, „H.323 Events“
MSG_H323_STACK_ERROR	B.2.8, „H.323 Events“
MSG_H323_UNEXPECTED_MESSAGE	B.2.8, „H.323 Events“
MSG_H323_UNEXPECTED_RETURN_VALUE	B.2.8, „H.323 Events“
MSG_H323CLIENT_INVALID_ADMIN_MSG	B.2.24, „H.323 Client Events“
MSG_H323CLIENT_INVALID_CLIENTID	B.2.24, „H.323 Client Events“
MSG_H323CLIENT_INVALID_PARAM	B.2.24, „H.323 Client Events“
MSG_H323CLIENT_MAPS_DIFFER	B.2.24, „H.323 Client Events“
MSG_H323CLIENT_NWRS_ENTRY_FAILED	B.2.24, „H.323 Client Events“
MSG_HACKER_ON_SNMP_PORT_TRAP	B.2.4, „Resource Monitoring Events“
MSG_HFAA_INTERNAL_ERROR	B.2.18, „HFA Adapter Events“
MSG_HFAA_INTERNAL_EVENT	B.2.18, „HFA Adapter Events“
MSG_HFAA_MEMORY_ERROR	B.2.18, „HFA Adapter Events“
MSG_HFAA_MESSAGE_ERROR	B.2.18, „HFA Adapter Events“
MSG_HFAA_PARAM_ERROR	B.2.18, „HFA Adapter Events“
MSG_HFAM_HAH_ALLOC_CHAN_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_HAH_ALLOC_CONF_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_ACCEPT_CLIENT_CON_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_ACCEPT_INETOA_CON_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_ACCEPT_TCPIP_CON_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_ALGORITM_OBJID_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_BIND_REGISOCK_ERR	B.2.17, „HFA Manager Events“

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MSG_HFAM_LIH_CREATE_REGISOCK_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_IPADR_TOO_LONG_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_LISTEN_REGISOCK_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_MAX_CON_EXCEED_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_PROTOCOL_LIST_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_RETURNED_SOCKET_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_SOCK_REUSE_ADR_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_SOCK_WOULDBLOCK_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_SUBNO_TOO_LONG_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_TCDATAGRAM_RCV_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_LIH_UNEXP_CORNET_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_MAIN_ILLEG_PORTNO_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_MAIN_NO_LOGONTIMER_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_MAIN_UNEXP_LWEVENT_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_MON_NO_MON_TIMER_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_ESTAB_NOTREG_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_INVAL_PWD_LEN_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_LOGIN_NOTREG_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_LOGON_REJECT_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_MISSING_L2INFO_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_RELIN_NOTREG_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_SUBNO_NOTCONFIG_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_REG_SUBNO_TOO_LONG_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_SIH_CORNET_LONGER_28_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_SIH_INVAL_TSLOT_PARAM_ERR	B.2.17, „HFA Manager Events“
MSG_HFAM_SIH_NO_LOGIN_TIMER_ERR	B.2.17, „HFA Manager Events“
MSG_HIP_ALLOC_DEV_OBJ	B.2.31, „HIP Events“
MSG_HIP_ALLOC_MES_SI	B.2.31, „HIP Events“
MSG_HIP_NO_CLBLK	B.2.31, „HIP Events“
MSG_HIP_NO_CLPOOL_ID	B.2.31, „HIP Events“
MSG_HIP_NO_CLUSTER	B.2.31, „HIP Events“
MSG_HIP_NO_DEVLOAD	B.2.31, „HIP Events“
MSG_HIP_NO_DEVSTART	B.2.31, „HIP Events“
MSG_HIP_NO_MEM_CL	B.2.31, „HIP Events“
MSG_HIP_NO_MEM_CLBLK	B.2.31, „HIP Events“
MSG_HIP_NO_MEM_TO_SI	B.2.31, „HIP Events“
MSG_HIP_NO_NETPOOL_INIT	B.2.31, „HIP Events“

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MSG_HIP_NO_OBJ_INIT	B.2.31, „HIP Events“
MSG_HIP_NO_PMBLK	B.2.31, „HIP Events“
MSG_HIP_PKTLEN_ZERO	B.2.31, „HIP Events“
MSG_HIP_PMBLK_ZERO	B.2.31, „HIP Events“
MSG_IP_LINK_ FAILURE	B.2.4, „Resource Monitoring Events“
MSG_IP_RTP_QUALITY_FAILURE	B.2.10, „RTPQM Events“
MSG_IP_RTP_QUALITY_WARNING	B.2.10, „RTPQM Events“
MSG_IPACCSRV_INTERNAL_ERROR	B.2.44, „IP Accounting Events“
MSG_IPACCSRV_LOGON	B.2.44, „IP Accounting Events“
MSG_IPACCSRV_MARK_REACHED	B.2.44, „IP Accounting Events“
MSG_IPACCSRV_MEMORY_ERROR	B.2.44, „IP Accounting Events“
MSG_IPACCSRV_MESSAGE_ERROR	B.2.44, „IP Accounting Events“
MSG_IPACCSRV_OVERFLOW	B.2.44, „IP Accounting Events“
MSG_IPACCSRV_SOCKET_ERROR	B.2.44, „IP Accounting Events“
MSG_IPF_ON_OFF	B.2.38, „IP Filter Events“
MSG_IPF_PARAMETER	B.2.38, „IP Filter Events“
MSG_IPF_STARTED	B.2.38, „IP Filter Events“
MSG_IPF_STOPPED	B.2.38, „IP Filter Events“
MSG_IPNC_CP_ASYNCH	B.2.25, „IPNC Events“
MSG_IPNC_INCONSISTENT_STATE	B.2.25, „IPNC Events“
MSG_IPNC_INTERNAL_ERROR	B.2.25, „IPNC Events“
MSG_IPNC_MESSAGE_DUMP	B.2.25, „IPNC Events“
MSG_IPNC_MESSAGE_ERROR	B.2.25, „IPNC Events“
MSG_IPNC_PARAM_ERROR	B.2.25, „IPNC Events“
MSG_IPNCA_ERROR	B.2.26, „IPNCA Events“
MSG_IPNCV_INTERNAL_ERROR	B.2.2, „Status Events“
MSG_IPNCV_MEMORY_ERROR	B.2.4, „Resource Monitoring Events“
MSG_IPNCV_SIGNALING_ERROR	B.2.46, „IPNCV Events“
MSG_IPNCV_STARTUP_ERROR	B.2.2, „Status Events“
MSG_IPNCV_STARTUP_SHUTDOWN	B.2.2, „Status Events“
MSG_IPSTACK_INVALID_PARAM	B.2.40, „IP Stack Events“
MSG_IPSTACK_NAT_ERROR	B.2.40, „IP Stack Events“
MSG_IPSTACK_SOH_ERROR	B.2.40, „IP Stack Events“
MSG_ISDN_CMR_ADD_OBJECT_FAILED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_DEVICE_PTR_BAD	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_GEN_CALL_REF_FAILED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_GENRIC_EVENT	B.2.7, „SCN Protocol Events“

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MSG_ISDN_CMR_INIT_FAILED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_MAND_FIELDS_MISSING	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_MESSAGE_ERROR	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_MSG_DECODE_FAILED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_MSG_ENCODE_FAILED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_MSG_SEND_FAILED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_MSG_UNEXPECTED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_NEW_OBJECT_FAILED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_OBJECT_NOT_FOUND	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_PROTOCOL_ERROR	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_SEG_MSG_ERROR	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_SESSION_NOT_FOUND	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_STATUS_MSG_RECEIVED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_TIMER_EXPIRED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_UNEXPECTED_ERROR	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_UNEXPECTED_EVENT	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_UNEXPECTED_VALUE	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_UNH_STATE_EVENT	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_UNIMPLEMENTED	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_WRONG_DEVICE_TYPE	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_WRONG_INTERFACE	B.2.7, „SCN Protocol Events“
MSG_ISDN_CMR_WRONG_PROTVAR	B.2.7, „SCN Protocol Events“
MSG_ISDN_DEVICE_PTR_NOT_FOUND	B.2.7, „SCN Protocol Events“
MSG_ISDN_ERROR	B.2.7, „SCN Protocol Events“
MSG_ISDN_NO_ERROR	B.2.7, „SCN Protocol Events“
MSG_ISDN_NULL_PTR	B.2.7, „SCN Protocol Events“
MSG_ISDN_OVERLOAD_CONDITION	B.2.7, „SCN Protocol Events“
MSG_ISDN_RESOURCE_IN_USE_BY_O_CALL	B.2.7, „SCN Protocol Events“
MSG_ISDN_RESOURCE_NOT_AVAILABLE	B.2.7, „SCN Protocol Events“
MSG_ISDN_RESOURCE_NOT_IN_SERVICE	B.2.7, „SCN Protocol Events“
MSG_ISDN_START_UP	B.2.7, „SCN Protocol Events“
MSG_ISDN_START_UP_ERROR	B.2.7, „SCN Protocol Events“
MSG_LDAP_ENCODE_DECODE_ERROR	B.2.4, „Resource Monitoring Events“
MSG_LDAP_GENERAL_ERROR	B.2.4, „Resource Monitoring Events“
MSG_LDAP_IP_LINK_ERROR	B.2.4, „Resource Monitoring Events“
MSG_LDAP_MEMORY_ERROR	B.2.4, „Resource Monitoring Events“
MSG_LDAP_SOCKET_ERROR	B.2.4, „Resource Monitoring Events“

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MSG_LDAP_SUCCESSFULLY_STARTED	B.2.2, „Status Events“
MSG_LIC_DATA_ACCEPTED	B.2.30, „Licence Management Events“
MSG_LIC_DATA_CORRUPTED	B.2.30, „Licence Management Events“
MSG_LIC_DATA_NOT_ACCEPTED	B.2.30, „Licence Management Events“
MSG_LIC_DATA_REDUCED	B.2.30, „Licence Management Events“
MSG_LIC_DATA_VERSION_MISMATCH	B.2.30, „Licence Management Events“
MSG_LLC_EVENT_INVALID_PARAMETER_VALUE	B.2.50, „Events for LLC operation“
MSG_LLC_EVENT_MISSING_PARAMETER	B.2.50, „Events for LLC operation“
MSG_LLC_EVENT_MISSING_RESOURCE	B.2.50, „Events for LLC operation“
MSG_LLC_EVENT_UNEXPECTED_RETURN_VALUE	B.2.50, „Events for LLC operation“
MSG_MAF_ETHERNET_HEADER	B.2.39, „MAC Filter Events“
MSG_MAF_NETBUFFER	B.2.39, „MAC Filter Events“
MSG_MAF_NO_OF_RULES	B.2.39, „MAC Filter Events“
MSG_MAF_ON_OFF	B.2.39, „MAC Filter Events“
MSG_MAF_PARAMETER	B.2.39, „MAC Filter Events“
MSG_MAF_STARTED	B.2.39, „MAC Filter Events“
MSG_MAF_STOPPED	B.2.39, „MAC Filter Events“
MSG_MAND_PARAM_MISSING	B.2.6, „Call Control and Feature Events“
MSG_MPH_INFO	B.2.27, „MPH Events“
MSG_MSP_HDLC_ERROR	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_MSP_HDLC_INFO	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_NU_CAR_FAILED	B.2.15, „NU Events“
MSG_NU_CAR_RESP_INVALID	B.2.15, „NU Events“
MSG_NU_DEV_TAB_NOT_FOUND	B.2.15, „NU Events“
MSG_NU_EVENT_EXCEPTION	B.2.15, „NU Events“
MSG_NU_FREE_CHN_COMF_TOO_LATE	B.2.15, „NU Events“
MSG_NU_FREE_CHN_UNEXPECTED	B.2.15, „NU Events“
MSG_NU_GENERAL_ERROR	B.2.15, „NU Events“
MSG_NU_INTERNAL_ERROR	B.2.15, „NU Events“
MSG_NU_INVALID_CIDL	B.2.15, „NU Events“
MSG_NU_IP_ERROR	B.2.15, „NU Events“
MSG_NU_NO_FREE_TRANSACTION	B.2.15, „NU Events“
MSG_NU_NO_PORT_DATA	B.2.15, „NU Events“
MSG_NU_SOH_RESP_INVALID	B.2.15, „NU Events“
MSG_NU_SUPERFLUOS_MSG	B.2.15, „NU Events“
MSG_NU_TCP_LISTENER_FAILED	B.2.15, „NU Events“
MSG_NU_TOO_MUCH_DIGITS	B.2.15, „NU Events“

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MSG_NU_TRANSPCONT_MISSING	B.2.15, „NU Events“
MSG_NU_UNEXPECTED_MSG	B.2.15, „NU Events“
MSG_NU_UNEXPECTED_SETUP	B.2.15, „NU Events“
MSG_NU_UNEXPECTED_TIMER	B.2.15, „NU Events“
MSG_NU_UNKNOWN_MESSAGE	B.2.15, „NU Events“
MSG_NU_WRONG_CALL_REF	B.2.15, „NU Events“
MSG_NULC_INTERNAL_ERROR	B.2.16, „NU Leg Control Events“
MSG_NULC_INTERNAL_EVENT	B.2.16, „NU Leg Control Events“
MSG_NULC_MEMORY_ERROR	B.2.16, „NU Leg Control Events“
MSG_NULC_MESSAGE_ERROR	B.2.16, „NU Leg Control Events“
MSG_NULC_PARAM_ERROR	B.2.16, „NU Leg Control Events“
MSG_NWRS_DEVICE_NOT_FOUND	B.2.5, „Routing Events“
MSG_NWRS_DEVICE_TABLE_NOT_FOUND	B.2.5, „Routing Events“
MSG_NWRS_DPLN_ENTRY_INVALID	B.2.5, „Routing Events“
MSG_NWRS_DPLN_NOT_FOUND	B.2.5, „Routing Events“
MSG_NWRS_EMPTY_FIELD_ECHOED	B.2.5, „Routing Events“
MSG_NWRS_NO_DPLN_FOUND_FOR_DEVICE	B.2.5, „Routing Events“
MSG_NWRS_ODR_COMMAND_UNKNOWN	B.2.5, „Routing Events“
MSG_NWRS_ODR_NOT_FOUND	B.2.5, „Routing Events“
MSG_NWRS_ROUTE_NOT_FOUND	B.2.5, „Routing Events“
MSG_NWRS_UNKNOWN_FIELD_ECHOED	B.2.5, „Routing Events“
MSG_NWRS_UNSPEC_ERROR	B.2.5, „Routing Events“
MSG_OAM_DMA_RAM_THRESHOLD_REACHED	B.2.4, „Resource Monitoring Events“
MSG_OAM_FAN_OUT_OF_SERVICE	B.2.4, „Resource Monitoring Events“
MSG_OAM_HIGH_TEMPERATURE_EXCEPTION	B.2.4, „Resource Monitoring Events“
MSG_OAM_INTERNAL_EVENT	B.2.28, „OAM Events“
MSG_OAM_PRIO_INCREASED	B.2.28, „OAM Events“
MSG_OAM_PRIO_SWITCHED_BACK	B.2.28, „OAM Events“
MSG_OAM_PSU_OR_RPS_OUT_OF_SERVICE	B.2.4, „Resource Monitoring Events“
MSG_OAM_PUT_TO_QUEUE_FAILED	B.2.28, „OAM Events“
MSG_OAM_QUEUE_BLOCKED	B.2.28, „OAM Events“
MSG_OAM_QUEUE_FULL	B.2.28, „OAM Events“
MSG_OAM_RAM_THRESHOLD_REACHED	B.2.4, „Resource Monitoring Events“
MSG_OAM_THRESHOLD_REACHED	B.2.4, „Resource Monitoring Events“
MSG_OAM_TIMESYNC	B.2.28, „OAM Events“
MSG_OAM_TIMESYNC_FAILED	B.2.28, „OAM Events“
MSG_ERH_NO_LICENSE	B.2.48, „Error Events“

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MSG_OSF_PCS_EXCEPTION	B.2.3, „Reboot Events“
MSG_PPP_STACK_PROC	B.2.21, „PPP Stack Events“
MSG_PPPM_ERR_CONFIG	B.2.20, „PPP MANAGER Events“
MSG_PPPM_ERR_OPERATION	B.2.20, „PPP MANAGER Events“
MSG_REG_ERROR_FROM_SOH	B.2.14, „REG Events“
MSG_REG_GLOBAL_ERROR	B.2.14, „REG Events“
MSG_REG_NIL_PTR_FROM_SOH	B.2.14, „REG Events“
MSG_REG_NO_MEMORY	B.2.14, „REG Events“
MSG_REG_NO_REGISTRATION_POSSIBLE	B.2.14, „REG Events“
MSG_REG_REQUEST_WITHIN_REGISTRATION	B.2.14, „REG Events“
MSG_REG_SOH_SEND_DATA_FAILED	B.2.14, „REG Events“
MSG_REG_SOH_UNKNOWN_EVENT_FROM_SOH	B.2.14, „REG Events“
MSG_RESTORE_CFG_REBOOT	B.2.3, „Reboot Events“
MSG_SCN_ADD_PARAMETER_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_BIND_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_DEV_NOT_IN_DEVLIST	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_ERROR_12_MSG	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_GET_ADMMSG_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_GET_LDAPMSG_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_OPEN_STREAM_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_OPERATION_ON_STREAM_FAILED	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_POLL_FD	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_UNEXPECTED_L2_MSG	B.2.33, „MAGIC/Device Manager Events“
MSG_SCN_UNEXPECTED_POLL_EVENT	B.2.33, „MAGIC/Device Manager Events“
MSG_SDR_INIT	B.2.6, „Call Control and Feature Events“
MSG_SDR_UNEXPECTED_EVENT	B.2.6, „Call Control and Feature Events“
MSG_SI_L2STUB_COUDNT_OPEN_STREAM	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_ERROR_INIT_DRIVER	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_NO_ALLOC	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_NO_CLONE	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_OPEN_OTHER_STREAM_NOT_POSSIBLE	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_PORT_NOT_OPEN	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_STREAM_ALREADY_OPEN	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_UNEXPECTED_DB_TYPE	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_UNEXPECTED_EVENT_CODE	B.2.32, „SI Events (System Interface Events)“
MSG_SI_L2STUB_UNKNOWN_SOURCE_PID	B.2.32, „SI Events (System Interface Events)“
MSG_SIP_FM_INTERNAL_ERROR	B.2.2, „Status Events“

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MSG_SIP_FM_MSG_INTERNAL_ERROR	B.2.2, „Status Events“
MSG_SIP_FM_MSG_NOT_PROCESSED	B.2.2, „Status Events“
MSG_SIP_FM_STARTUP_FAILURE	B.2.2, „Status Events“
MSG_SNCP_ADD_OBJECT_FAILED	B.2.6, „Call Control and Feature Events“
MSG_SNCP_CHANNEL_ID_MISSING	B.2.6, „Call Control and Feature Events“
MSG_SNCP_COULD_NOT_CREATE_OBJECT	B.2.6, „Call Control and Feature Events“
MSG_SNCP_COULD_NOT_DELETE_OBJECT	B.2.6, „Call Control and Feature Events“
MSG_SNCP_COULD_NOT_SET_FORW_ENC	B.2.6, „Call Control and Feature Events“
MSG_SNCP_COULD_NOT_SET_REV_ENC	B.2.6, „Call Control and Feature Events“
MSG_SNCP_DEVICE_ID_MISSING	B.2.6, „Call Control and Feature Events“
MSG_SNCP_ERROR	B.2.6, „Call Control and Feature Events“
MSG_SNCP_NEITHER_ENC_COULD_BE_SET	B.2.6, „Call Control and Feature Events“
MSG_SNCP_NO_RESOURCE_ID	B.2.6, „Call Control and Feature Events“
MSG_SNCP_UNANTICIPATED_MESSAGE	B.2.6, „Call Control and Feature Events“
MSG_SNMP_TRAP_COLLECTOR_START_ERROR	B.2.3, „Reboot Events“
MSG_SPL_ADD_OBJECT_FAILED	B.2.6, „Call Control and Feature Events“
MSG_SPL_ERROR	B.2.6, „Call Control and Feature Events“
MSG_SPL_FMSEM_ERROR	B.2.6, „Call Control and Feature Events“
MSG_SPL_MISSING_CS_ID	B.2.6, „Call Control and Feature Events“
MSG_SPL_SESSION_NOT_FOUND	B.2.6, „Call Control and Feature Events“
MSG_SPL_UNANTICIPATED_MESSAGE	B.2.6, „Call Control and Feature Events“
MSG_SSM_BAD_NWRS_RESULT	B.2.6, „Call Control and Feature Events“
MSG_SSM_INVALID_PARAM	B.2.6, „Call Control and Feature Events“
MSG_SSM_NO_CSID	B.2.6, „Call Control and Feature Events“
MSG_SSM_NUM_OF_CALL_LEGS_2BIG	B.2.3, „Reboot Events“
MSG_SSM_SESSION_CREATION_FAILED	B.2.3, „Reboot Events“
MSG_SSM_UNSPEC_ERROR	B.2.6, „Call Control and Feature Events“
MSG_SYSTEM_REBOOT	B.2.3, „Reboot Events“
MSG_T90_ERROR	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_T90_INFO	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_TESTLW_ERROR	B.2.42, „Test Loadware Events“
MSG_TESTLW_INFO	B.2.42, „Test Loadware Events“
MSG_TLS_MUTEX_BLOCKED	B.2.28, „OAM Events“
MSG_TLS_POOL_SIZE_EXCEEDED	B.2.3, „Reboot Events“
MSG_VCAPI_ACCEPT_ERROR	B.2.22, „VCAPI Events“
MSG_VCAPI_ADD_OBJECT_FAILED	B.2.23, „VCAPI Application Events“
MSG_VCAPI_BUF_NOT_CREATED	B.2.22, „VCAPI Events“

Event Code	Section
MSG_VCAPI_CONF_ALLOC_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_CONF_WITHOUT_REQ	B.2.23, „VCAPI Application Events“
MSG_VCAPI_CONV_H2N_ERROR	B.2.22, „VCAPI Events“
MSG_VCAPI_CONV_H2N_FAILED	B.2.22, „VCAPI Events“
MSG_VCAPI_CONV_N2H_FAILED	B.2.22, „VCAPI Events“
MSG_VCAPI_COULD_NOT_CREATE_OBJECT	B.2.23, „VCAPI Application Events“
MSG_VCAPI_COULD_NOT_DELETE_OBJECT	B.2.23, „VCAPI Application Events“
MSG_VCAPI_COULD_NOT_FIND_CSID	B.2.23, „VCAPI Application Events“
MSG_VCAPI_COULD_NOT_FIND_OBJECT	B.2.23, „VCAPI Application Events“
MSG_VCAPI_COULD_NOT_FIND_PLCI	B.2.23, „VCAPI Application Events“
MSG_VCAPI_COULD_NOT_STORE_REQ	B.2.23, „VCAPI Application Events“
MSG_VCAPI_CSID_MISSING	B.2.23, „VCAPI Application Events“
MSG_VCAPI_DATA_B3_ALLOC_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_DATA_NOT_STORED	B.2.22, „VCAPI Events“
MSG_VCAPI_DISP_NOT_READY	B.2.22, „VCAPI Events“
MSG_VCAPI_ILLEGAL_LINK_NUMBER	B.2.23, „VCAPI Application Events“
MSG_VCAPI_ILLEGAL_PARTNER_NUMBER	B.2.23, „VCAPI Application Events“
MSG_VCAPI_IND_ALLOC_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_LINK_TABLE_FULL	B.2.22, „VCAPI Events“
MSG_VCAPI_LISTENING_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_MESSAGE_LENGTH_TOO_SHORT	B.2.23, „VCAPI Application Events“
MSG_VCAPI_MSG_NOT_SEND	B.2.22, „VCAPI Events“
MSG_VCAPI_MSGBASE_WITHOUT_CAPIMSG	B.2.23, „VCAPI Application Events“
MSG_VCAPI_MSGBASE_WITHOUT_DATAGWMSG	B.2.23, „VCAPI Application Events“
MSG_VCAPI_MSGBASE_WITHOUT_DISPMSG	B.2.23, „VCAPI Application Events“
MSG_VCAPI_NO_ALLOC_EXTENDED	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_ALLOC_MSG	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_ALLOC_SINGLE	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_CAPI_DATA	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_CLIENT	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_LIST_SOCKET	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_LNK_CONN	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_NEW_BUF	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_PLCI	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_PLCI_AVAILABLE	B.2.23, „VCAPI Application Events“
MSG_VCAPI_NO_PLCI_DATA_B3	B.2.22, „VCAPI Events“
MSG_VCAPI_NO_PLCI_DISCONNECT	B.2.22, „VCAPI Events“

Event Code	Section
MSG_VCAPI_NO_RCV_BUFFER	B.2.22, „VCAPI Events“
MSG_VCAPI_PLCI_NOT_FOUND	B.2.22, „VCAPI Events“
MSG_VCAPI_RCV_LEN_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_RECEIVE_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_SERVER_ERROR	B.2.23, „VCAPI Application Events“
MSG_VCAPI_SOCK_NOT_AVAIL	B.2.22, „VCAPI Events“
MSG_VCAPI_SOCKET_BIND_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_SOCKET_NOT_OPEN	B.2.22, „VCAPI Events“
MSG_VCAPI_SOCKET_RCV_ERR	B.2.22, „VCAPI Events“
MSG_VCAPI_TOO_MANY_CLIENTS	B.2.22, „VCAPI Events“
MSG_VCAPI_UNANTICIPATED_CAPI_MESSAGE	B.2.23, „VCAPI Application Events“
MSG_VCAPI_UNANTICIPATED_DISP_MESSAGE	B.2.23, „VCAPI Application Events“
MSG_VCAPI_UNANTICIPATED_MESSAGE	B.2.23, „VCAPI Application Events“
MSG_VCAPI_UNANTICIPATED_MESSAGE_BASE	B.2.23, „VCAPI Application Events“
MSG_VCAPI_UNKNOWN_MSG_N2H	B.2.22, „VCAPI Events“
MSG_VCAPI_UNKNOWN_NTFY	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_BUF_LEN	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_CONV_H2N	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_CONV_N2H	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_EVENT_CAPI	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_EVENT_SRV	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_LENGTH_MSG	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_LINKNUM	B.2.22, „VCAPI Events“
MSG_VCAPI_WRONG_MSG_LENGTH	B.2.22, „VCAPI Events“
MSG_WEBSERVER_INTERNAL_ERROR	B.2.28, „OAM Events“
MSG_WEBSERVER_MAJOR_ERROR	B.2.3, „Reboot Events“
MSG_X25_ERROR	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_X25_INFO	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_X75_ERROR	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_X75_INFO	B.2.43, „Fax Converter, HDLC and X.25 Events“
MSG_XMLUTILS_ERROR	B.2.47, „XMLUTILS Events“
QDC_ERROR_IN_CLIENT	B.2.52, „QDC CGWA related Events“
QDC_ ERROR_IN_COMMON_CLIENT	B.2.51, „Client related events“
QDC_INVALID_CONFIGURATION	B.2.52, „QDC CGWA related Events“
QDC_MSG_QUEUE_ERROR	B.2.51, „Client related events“
QDC_PERSYSTENCY_ERROR	B.2.52, „QDC CGWA related Events“
QDC_SIGNALLING_DATA_ERROR	B.2.51, „Client related events“

Event Code	Section
QDC_SYSTEM_ERROR	B.2.51, „Client related events“
QDC_VOIPSD_ERROR	B.2.53, „QDC VoIPSD error report events“
SIP_INFORMATION	B.2.54, „SIP events“
SIP_INVALID_PARAMETER_VALUE	B.2.54, „SIP events“
SIP_INVALID_POINTER	B.2.54, „SIP events“
SIP_REBOOT	B.2.3, „Reboot Events“
SIP_UNEXPECTED_RETURN_VALUE	B.2.54, „SIP events“

B.2.2 Status Events

MSG_GW_SUCCESSFULLY_STARTED

```
EventText: 11/21/2001 20:46:52
```

Type: **Information**

Gateway was started successfully at given time. An SNMP trap is generated.

MSG_IPNCV_STARTUP_ERROR

```
EventText: IPNCV Startup: %s
```

Type: **Major**

IPNCV could not be started. An SNMP trap is generated. Create a TR/MR.

MSG_IPNCV_STARTUP_SHUTDOWN

```
EventText: IPNCV start/stop: %s
```

Type: **Information**

IPNCV was started or stopped successfully. An SNMP trap is generated.

MSG_IPNCV_INTERNAL_ERROR

```
EventText: Internal IPNCV error: %s
```

Type: **Warning**

Software error: invalid internal data found. An SNMP trap will be generated with the profile IP-NCV-Detailed.

MSG_LDAP_SUCCESSFULLY_STARTED

`EventText: %s`

Type: **Information**

LDAP started successfully.

FP_EVT_INFORMATION

`EventText: %x %c #%d/%d %x-%x %s`

Type: **Information**

Internal SW event – for information only

FP_EVT_TRACE_STOP

`EventText: %x %c #%d/%d %x-%x %s`

Type: **Information**

Trace stop provided

FP_EVT_TRACE_START

`EventText: %x %c #%d/%d %x-%x %s`

Type: **Information**

Trace start provided

FP_EVT_SNMP_TRAP

`EventText: %x %c #%d/%d %x-%x %s`

Type: **Warning**

Important events – SNMP trap is generated.

FP_EVT_MINOR

`EventText: %x %c #%d/%d %x-%x %s`

Type: **Minor**

IInterner SW-Fehler mit remote signaling

FP_EVT_INDETERMINATE

`EventText: %x %c #%d/%d %x-%x %s`

Type: **Information**

Internal software error with trace stop and remote signaling

MSG_SIP_FM_MSG_INTERNAL_ERROR

`EventText: %p`

Type: **Major**

Software error within SIP_FM_MSG

MSG_SIP_FM_STARTUP_FAILURE

`EventText: SIP_FM startup failed: %s`

Type: **Major**

Software error during SIP_FM start

MSG_SIP_FM_INTERNAL_ERROR

`EventText: %p`

Type: **Major**

Software error within SIP_FM

MSG_SIP_FM_MSG_NOT_PROCESSED

`EventText: SIP_FM received an illegal message: %d`

Type: **Major**

SIP_FM could not send a "received" message.

B.2.3 Reboot Events

MSG_CAT_HSA_REBOOT

`EventText: HSA (Reboot) Q931 cmCallNew() failed:reaching vtNodeCount limit`

Type: **Critical**

The H.323 stack adapter has run out of internal resources and causes a reboot. The reboot is executed. An SNMP trap is generated. Include the event log with the error report.

MSG_OSF_PCS_EXCEPTION

`EventText: "%p"`

Type: **Critical**

The OSF has registered a critical exception. The reboot will still be executed.

MSG_ADMIN_REBOOT

Type: **Information**

`EventText: Reboot initiated by Admin`

A restart forced by the administrator is executed. An SNMP trap is generated.

`EventText: Reboot initiated by Admin (SW Image Activation)`

A restart forced by the administrator by loading a new software image is executed. An SNMP trap is generated.

`EventText: Reboot initiated by Admin (SW Upgrade)`

A restart forced by the administrator by loading new data is executed. An SNMP trap is generated.

MSG_SYSTEM_REBOOT

`EventText: Reboot initiated by Garbage Collection. Available memory: xxxx`

Type: **Information**

A restart necessitated by an internal garbage collection is executed. An SNMP trap is generated.

MSG_EXCEPTION_REBOOT

`EventText: Reboot initiated by VxWorks Task Exception`

Type: **Information**

A restart is executed following a VxWorks task. An SNMP trap is generated.

MSG_RESTORE_CFG_REBOOT

`EventText: Special reboot initiated by Admin (Backup Service)`

Type: **Information**

A restart necessitated by a HBS data restore procedure is executed. An SNMP trap is generated.

MSG_GW_OBJ_MEMORY_EXHAUSTED

```
EventText: Object memory has been exhausted. Last allocation size: xxxx.
Using failsafe areas to attempt a graceful shutdown
```

Type: **Critical**

Possible memory problems: too much memory has been reserved, or not enough memory available. The necessary reboot is executed. An SNMP trap is generated.

MSG_GW_OBJ_ALLOC_FAILED

```
EventText: Memory allocation in partition xxx failed. xxx Error. Last
allocation size: xxxx. Rebooting ...
```

Type: **Critical**

Possible memory problems: too much memory has been reserved, or not enough memory available. The necessary reboot is executed. An SNMP trap is generated.

MSG_GW_OBJ_MEMORY_INCONSISTENT

```
EventText: Memory corruption in partition xxx XXX Error. Invalid block
address: xxxx. Rebooting ...
```

Type: **Critical**

Possible memory problems: memory was overwritten, or an attempt was made to free up memory that has already been freed up. The necessary reboot is executed. An SNMP trap is generated.

ASSERTION_FAILED_EVENT

`EventText: Assertion failed ...`

Type: **Information**

Internal software encoding problem. The necessary reboot is executed. An SNMP trap is generated. Create a TR/MR.

EXIT_REBOOT_EVENT

Type: **Information**

`EventText: Rebooting due to Exit Event ...`

Internal software encoding problem. The necessary reboot is executed. An SNMP trap is generated. Create a TR/MR.

`EventText: cannot create Task tV24CliI. ...`

Task generation on the V.24-CLI interface has failed. The necessary reboot is executed.

`EventText: internal error: not enough memory ...`

The reservation of memory has failed. The necessary reboot is executed.

`EventText: CLI: read operation from STD_IN has failed ...`

Input/output faulty. The necessary reboot is executed.

MSG_TLS_POOL_SIZE_EXCEEDED

`EventText: maximum number of elements exceeded`

Type: **Major**

Problem with internal pool size configuration. The necessary reboot is executed. An SNMP trap is generated. Create a TR/MR.

MSG_SSM_NUM_OF_CALL_LEGS_2BIG

`EventText: More than 2 call Legs: not supported! CSID: %x/%x`

Type: **Major**

No more than two call Legs per session are permitted. This has caused the software to become unstable. The necessary reboot is executed. An SNMP trap is generated.

MSG_SSM_SESSION_CREATION_FAILED

`EventText: Session creation failed`

Type: **Major**

Signalling is no longer possible because a session could not be created. The necessary reboot is executed. An SNMP trap is generated.

MSG_WEBSERVER_MAJOR_ERROR

`EventText: %p`

Type: **Major**

Internal error on the web server. A restart is forced since this would affect other web server activities. The reboot is executed.

MSG_SNMP_TRAP_COLLECTOR_START_ERROR

`EventText: Trap collector could not be started:%n%s`

Type: **Information**

The thread in the trace collector could not be started. Check whether trap port 162 has already been used elsewhere.

FP_EVT_CRITICAL

`EventText: %x %c #%d/%d %x-%x %s`

Type: **critical**

Reboot triggered by a software error.

FP_EVT_MAJOR

`EventText: %x %c #%d/%d %x-%x %s#`

Type: **major**

Reboot because resources are exhausted.

FP_EVT_WARNING

`EventText: %x %c #%d/%d %x-%x %s`

Type: **warning**

Reboot initiated via the tool.

SIP_REBOOT

`EventText: InternalSetUserA`

Type: **csevMajor**

Configuration of the SIP stack failed.

B.2.4 Resource Monitoring Events

MSG_IP_LINK_ FAILURE

```
EventText: IP Link [still] out of order
```

Type for this log entry: **Warning**

An IP network connection is not or is still not possible. An SNMP trap is generated. Check the terminal connections and cables

```
EventText: IP Link no longer out of order
```

Type for this log entry: **Cleared**

The IP network connection has become available again. An SNMP trap is generated.

MSG_OAM_RAM_THRESHOLD_REACHED

```
EventText: High WaterMark "XXX" [still] reached:
           Configured: xxx Current: xxx
```

Type for this log entry: **Warning**

The system memory limit has been reached. Details are listed in the event message (percentage limit value, current value and capacity utilization). This may be caused by a high volume of calls. An SNMP trap is generated.

```
EventText: High WaterMark "XXX" no longer reached:
           Configured: xxx Current: xxx
```

Type for this log entry: **Cleared**

The problem with the system memory limit has been eliminated. Lower memory utilization may be caused by a lower call volume. An SNMP trap is generated.

MSG_OAM_DMA_RAM_THRESHOLD_REACHED

```
EventText: High WaterMark "XXX" [still] reached:
           Configured: xxx Current: xxx
```

Type for this log entry: **Warning**

The DMA memory limit has been reached. Details are listed in the event message (percentage limit value, current value and capacity utilization). This may be caused by a high volume of calls. An SNMP trap is generated.

```
EventText: High WaterMark "XXX" no longer reached:
           Configured: xxx Current: xxx
```

Type for this log entry: **Cleared**

The problem with the DMA memory limit has been eliminated. Lower memory utilization may be caused by a lower call volume. An SNMP trap is generated.

MSG_OAM_THRESHOLD_REACHED

```
EventText: High/Low WaterMark "XXX" [still] reached:
           Configured: xxx Current: xxx
```

Type for this log entry: **Warning**

A threshold value has been reached (in the flash memory, in the file system memory capacity or in the netstack IP resources). Details are listed in the event message (percentage limit value, current value and capacity utilization). An SNMP trap is generated.

```
EventText: High/Low WaterMark "XXX" no longer reached:
           Configured: xxx Current: xxx
```

Type for this log entry: **Cleared**

The problem with the threshold value has been eliminated. An SNMP trap is generated.

MSG_OAM_PSU_OR_RPS_OUT_OF_SERVICE

```
EventText: PSU or RPS [still] out of Service
```

Type for this log entry: **Warning**

There is (still) a problem with PSU or RPS. An SNMP trap is generated. Check the PSU and RPS and replace them if necessary.

```
EventText: PSU or RPS no longer out of Service
```

Type for this log entry: **Cleared**

The problem with the PSU or RPS has been eliminated. An SNMP trap is generated.

MSG_OAM_FAN_OUT_OF_SERVICE

```
EventText: Fan [still] out of Service
```

Type for this log entry: **Warning**

There is (still) a problem with the fan. An SNMP trap is generated. Check the fan and replace it if necessary.

```
EventText: Fan no longer out of Service
```

Type for this log entry: **Cleared**

The problem with the fan has been eliminated. An SNMP trap is generated.

MSG_OAM_HIGH_TEMPERATURE_EXCEPTION

```
EventText: High WaterMark "Temperature" reached: Configured: xxx
Current: xxx . Gateway stopped.
```

Type: **Warning**

A serious problem has occurred with the temperature. The gateway has been stopped. Check the environment and replace boards and/or fan if necessary.

MSG_CAR_MALLOC_FAILED

```
EventText: Malloc failed
```

Type: **Major**

The reservation of memory has failed.

MSG_IPNCV_MEMORY_ERROR

```
EventText: IPNCV Memory: %s
```

Type: **Major**

Memory overflow: an SNMP trap is generated. Restart the gateway. Create a TR/MR.

MSG_LDAP_IP_LINK_ERROR

```
EventText: IP Link out of order
```

Type: **Warning**

No network-IP connection.

MSG_LDAP_MEMORY_ERROR

```
EventText: No Materna Buffer Available
```

Type: **Major**

Not enough memory to send/receive a message.

MSG_LDAP_ENCODE_DECODE_ERROR

```
EventText: Unable to Encode/Decode LDAP Msg
```

Type: **Major**

BER encoding or decoding of a LDAP-ASN.1 message failed.

MSG_LDAP_SOCKET_ERROR

`EventText: LDAP Socket Failure`

Type: **Major**

An error has occurred with LDAP socket calls.

MSG_LDAP_GENERAL_ERROR

`EventText: LDAP Returns General Error`

Type: **Warning**

An error has occurred with LDAP function calls.

MSG_HACKER_ON_SNMP_PORT_TRAP

`EventText: %s has tried to connect with TCP port 7161`

Type: **Information**

The IP address specified has made an attempt to connect with the SNMP TCP port 7161.

B.2.5 Routing Events

MSG_CAT_NWRS

Type: **Warning/Major**

Invalid data for NPI or TONE value in an ODR command. The command is ignored. This message may also be displayed if an administrator switches the ODR while the system is running. Check the ODR commands NPITYPE, TONTYPE (and CGNPITYPE, CGTONTYPE) for plausible values.

MSG_NWRS_DPLN_ENTRY_INVALID

`EventText: Dial Plan Entry invalid: Dpln=#, DplnEntry=#member`

Type: **Minor**

Syntax error in the numbering plan: characters other than `0123456789*#ANXZ-` are not allowed. Use permitted characters only. Do not use more than one separator in sequence and do not use separators at the beginning or at the end.

MSG_NWRS_NO_DPLN_FOUND_FOR_DEVICE

`EventText: Dial Plan not found for Device #port`

Type: **Major**

The specified port is not assigned to a specific numbering plan entry. Assign the specified port in the numbering plan and, if necessary, generate a new numbering plan first.

MSG_NWRS_EMPTY_FIELD_ECHOED

```
EventText: Empty field  # echoed by Out Dial Rule #
```

Type: **Warning**

The echo command of an outdial rule for outgoing calls results in a blank or implausible substring. Check the digit string of the numbering plan entry in conjunction with the echo commands of the outdial rule for outgoing calls.

MSG_NWRS_UNKNOWN_FIELD_ECHOED

```
EventText: Unknown field  # echoed by Out Dial Rule #
```

Type: **Minor**

The echo command of an outdial rule for outgoing calls results in a blank or implausible substring. Check the digit string of the numbering plan entry in conjunction with the echo commands of the outdial rule for outgoing calls.

MSG_NWRS_ODR_COMMAND_UNKNOWN

```
EventText: Unknown Command ...string in Out Dial Rule #
```

Type: **Minor**

An outdial rule for outgoing calls contains an unrecognizable command or an invalid value. Check the syntax of the outdial rule for keywords and separator characters (':' and ';') as well as all constants and limit values.

MSG_NWRS_ODR_NOT_FOUND

```
EventText: Out Dial Rule # not found“
```

Type: **Warning**

A gateway contains an index that cannot be resolved in outdial rules for outgoing calls. Use an outdial rule already configured for outgoing calls or create a new one.

MSG_NWRS_DEVICE_NOT_FOUND

```
EventText: Device # port not found
```

Type: **Major**

An invalid port has been assigned to a route member. Assign a valid destination port to the route member.

MSG_NWRS_DEVICE_TABLE_NOT_FOUND

`EventText: Device Table not found`

Type: **Major**

A port is not available. Try to resolve the problem by restarting the hardware.

MSG_NWRS_ROUTE_NOT_FOUND

`EventText: Route # not found`

Type: **Major**

A numbering plan member contains a route number that cannot be resolved. Use a route that has already been configured or create a new one.

MSG_NWRS_DPLN_NOT_FOUND

`EventText: Dial Plan not found: Dpln %I`

Type: **Major**

A numbering plan with the specified ID could not be found.

MSG_NWRS_UNSPEC_ERROR

`EventText: %p`

Type: **Major**

Inconsistent software status, for example, as a result of invalid data.

B.2.6 Call Control and Feature Events

MSG_SDR_INIT

`EventText:` SDR init `%p`

Type: **Major**

SDR could not be started (no files). An error occurred during initialization of SDR.

MSG_SDR_UNEXPECTED_EVENT

`EventText: SDR: Unexpected event %n%M%n in state %s%n from %s - EXCEP: %n%e`

Type: **Warning**

Unexpected or unregistered message.

MSG_SNCP_UNANTICIPATED_MESSAGE

`EventText: SCN Payload: Unanticipated Message %s in state %s - EXCEP: %n%e`

Type: **Warning**

An unknown message was received.

MSG_SNCP_DEVICE_ID_MISSING

```
EventText: SCN Payload: Mandatory field device ID missing in message 0x%X - 
EXCEP: %n%e
```

Type: **Major**

The mandatory field for the device ID, which is required for creating the resource ID, is missing from the specified message.

MSG_SNCP_CHANNEL_ID_MISSING

```
EventText: SCN Payload: Mandatory field device ID missing in message 0x%X - 
EXCEP: %n%e
```

Type: **Major**

The mandatory field for the channel ID, which is required for creating the resource ID, is missing from the specified message.

MSG_SNCP_NO_RESOURCE_ID

```
EventText: SCN Payload: No resource ID available in message 0x%X - EXCEP: 
%n%e
```

Type: **Major**

There is no resource ID in the specified message.

MSG_SNCP_COULD_NOT_DELETE_OBJECT

`EventText: SCN Payload: Could not delete SCN Payload Object - EXCEP: %n%e`

Type: **Major**

SCN payload object could not be deleted.

MSG_SNCP_COULD_NOT_CREATE_OBJECT

`EventText: SCN Payload: Could not delete SCN Payload Object - EXCEP: %n%e`

Type: **Major**

SCN payload object could not be deleted.

MSG_SNCP_COULD_NOT_SET_FORW_ENC

`EventText: SCN Payload: Could not set forward encoding to %I for CSID: (%s) and ResID: (%u) - EXCEP: %n%e`

Type: **Major**

Could not set forward encoding.

MSG_SNCP_COULD_NOT_SET_REV_ENC

`EventText: SCN Payload: Could not set reverse encoding to %I for CSID: (%s) and ResID: (%u) - EXCEP: %n%e`

Type: **Major**

Could not set reverse encoding.

MSG_SNCP_NEITHER_ENC_COULD_BE_SET

`EventText: SCN Payload: Neither encoding could be set for CSID: (%s) and ResID: (%u) - EXCEP: %n%e`

Type: **Major**

Neither encoding could be set.

MSG_SNCP_ADD_OBJECT_FAILED

`EventText: SCN Payload: Could not add SCN Payload Object - EXCEP: %n%e`

Type: **Major**

SCN payload object could not be added.

MSG_SNCP_ERROR

`EventText: SNCP Error: %p`

Type: **Warning/Major**

Inconsistent software status in SNCP component.

MSG_SPL_SESSION_NOT_FOUND

`EventText: No session for Session Payload Object found using CSID: %u) - EXCEP: %n%e`

Type: **Major**

No session object found.

MSG_SPL_ADD_OBJECT_FAILED

`EventText: Session Payload: Object could not be added - EXCEP: %n%e`

Type: **Major**

Object could not be added

MSG_SPL_MISSING_CS_ID

`EventText: Session Payload: Missing Call and Session ID - EXCEP: %n%e`

Type: **Major**

Call and session ID missing.

MSG_SPL_UNANTICIPATED_MESSAGE

`EventText: Session Payload: Unanticipated Message %s in state %s - EXCEP: %n%e`

Type: **Warning**

Unanticipated message.

MSG_SPL_ERROR

`EventText: SPL Error: %p`

Type: **Warning/Major**

Inconsistent software status in SPL component.

MSG_SPL_FMSEM_ERROR

`EventText: FMSEM Error: %p`

Type: **Warning/Major**

Inconsistent software status in FMSEM component, which is part of SPL.

MSG_SSM_NO_CSID

`EventText: Msg doesn’t contain a CSID !`

Type: **Major**

Call and session ID missing.

MSG_SSM_INVALID_PARAM

`EventText: Invalid parameter %s, value %x`

Type: **Major**

A parameter contained an invalid value.

MSG_SSM_UNSPEC_ERROR

`EventText: %p`

Type: **Major**

Inconsistent software status, for example, as a result of invalid data.

MSG_SSM_BAD_NWRS_RESULT

`EventText: Bad result from NWRS`

Type: **Major**

Probably a protocol loop was detected. Check configuration of the route from the signal source to the destination.

MSG_MAND_PARAM_MISSING

`EventText: Mandatory parameter %s for construction of message missing`

Type: **Major**

A CCP message could not be built from the message base because a mandatory parameter was missing.

B.2.7 SCN Protocol Events

MSG_ISDN_CMR_INIT_FAILED

`EventText: Initialization for protocol manager failed. %p`

Type: **Warning**

Initialization of the protocol manager failed.

MSG_ISDN_CMR_MAND_FIELDS_MISSING

`EventText: %pMandatory fields missing (ID %s)`

Type: **Warning**

Mandatory fields are missing from the message.

MSG_ISDN_CMR_OBJECT_NOT_FOUND

`EventText: %pThe object for Call and Session ID %s could not be found`

Type: **Critical**

The session object for a connection segment could not be found.

MSG_ISDN_CMR_UNIMPLEMENTED

`EventText: %pUnimplemented feature%s`

Type: **Warning**

The requested feature is not implemented.

MSG_ISDN_CMR_TIMER_EXPIRED

`EventText: %pTimer %S expired in state %S`

Type: **Information**

A timer has expired.

MSG_ISDN_CMR_WRONG_DEVICE_TYPE

`EventText: %p%Device Id %I is not a valid device type`

Type: **Warning**

A specified device type is invalid.

MSG_ISDN_CMR_MSG_DECODE_FAILED

`EventText: %pEvent decoding failed. %s %s %nEvent data: %b`

Type: **Warning**

Message decoding failed.

MSG_ISDN_CMR_NEW_OBJECT_FAILED

`EventText: %pThe object for this Call and Session ID could not be created`

Type: **Critical**

Creation of a session object for a call segment failed.

MSG_ISDN_CMR_ADD_OBJECT_FAILED

```
EventText: %pThe object created for this Call and Session ID could not be
added to the manager
```

Type: **Critical**

A call segment object could not be linked to the protocol manager.

MSG_ISDN_CMR_UNEXPECTED_EVENT

```
EventText: %pReceived unexpected event Message ID: %s
```

Type: **Information**

An unexpected event was received.

MSG_ISDN_CMR_SESSION_NOT_FOUND

```
EventText: %pThe session object for this Call and Session ID could not be
found by the manager
```

Type: **Critical**

The session object for the call segment was not found.

MSG_ISDN_CMR_STATUS_MSG_RECEIVED

```
EventText: %pL3 Status message received in state %s
```

Type: **Information**

A status message was received.

MSG_ISDN_CMR_WRONG_PROTVAR

```
EventText: %pProtocol Variant %I, Key %x is not valid. Using default Timer
Values !
```

Type: **Critical**

A protocol variant is invalid.

MSG_ISDN_CMR_GENRIC_EVENT

```
EventText: %p
```

Type: **Information**

A general event.

MSG_ISDN_RESOURCE_NOT_IN_SERVICE

`EventText: %pResource not in service, Resource State %s`

Type: **Information**

Wrong resource status: the resource does not exist in this service.

MSG_ISDN_RESOURCE_NOT_AVAILABLE

`EventText: %pResource not available, Resource State %s`

Type: **Information**

Resource not available.

MSG_ISDN_RESOURCE_IN_USE_BY_O_CALL

```
EventText: %pResource in use by other call. Resource not released, Resource
State %s
```

Type: **Information**

Resource reserved by another call (call collision).

MSG_ISDN_DEVICE_PTR_NOT_FOUND

`EventText: %pThe device ID could not be found`

Type: **Warning**

The device object could not be found.

MSG_ISDN_CMR_DEVICE_PTR_BAD

`EventText: %pNull device pointer`

Type: **Critical**

The device object pointer is pointing to NULL.

MSG_ISDN_CMR_MSG_ENCODE_FAILED

`EventText: %pEvent encoding failed. %s %s %nEvent data: %b`

Type: **Warning**

Encoding of message failed.

MSG_ISDN_CMR_MSG_SEND_FAILED

`EventText: %pL3 Message sending failed`

Type: **Critical**

Encoding of message failed.

MSG_ISDN_CMR_SEG_MSG_ERROR

`EventText: %pSegmented message error`

Type: **Minor**

Segmented message error.

MSG_ISDN_CMR_UNEXPECTED_ERROR

`EventText: %pUnexpected error`

Type: **Minor**

Unexpected error occurred.

MSG_ISDN_CMR_UNEXPECTED_VALUE

`EventText: %pUnexpected value for this Device ID`

Type: **Warning**

Unexpected value for device ID.

MSG_ISDN_CMR_MSG_UNEXPECTED

`EventText: %pUnexpected event`

Type: **Warning**

Message was unexpected in the current call status.

MSG_ISDN_CMR_GEN_CALL_REF_FAILED

`EventText: %pCould not generate a Call Reference`

Type: **Critical**

Generation of call reference failed.

MSG_ISDN_CMR_WRONG_INTERFACE

`EventText: %pWrong interface type %s`

Type: **Critical**

Wrong interface type.

MSG_ISDN_CMR_UNH_STATE_EVENT

`EventText: %pUnhandled event`

Type: **Warning**

Event was not handled in the appropriate call state.

MSG_ISDN_NULL_PTR

`EventText: %p%p`

Type: **Critical**

An attempt was made to use a pointer at NULL.

MSG_ISDN_ERROR

`EventText: %pError: %p`

Type: **Minor**

ISDN error.

MSG_ISDN_NO_ERROR

`EventText: %pNo Error`

Type: **Information**

No ISDN error.

MSG_ISDN_CMR_PROTOCOL_ERROR

`EventText: Protocol error: Device ID %d`

Type: **Warning**

Message did not comply with the present protocol.

MSG_ISDN_CMR_MESSAGE_ERROR

`EventText: Message Error 0x%X`

Type: **Minor**

Message contains an error.

MSG_ISDN_START_UP_ERROR

`EventText: %s: Start up error. %p`

Type: **Critical**

Error during startup of ISDN protocol.

MSG_ISDN_START_UP

`EventText: %s: Start up OK. %p`

Type: **Information**

ISDN startup concluded.

MSG_ISDN_OVERLOAD_CONDITION

`EventText: %pOverload Condition. SETUP received, RELEASE COMPLETE sent`

Type: **Information**

Overload reached: call cleared.

B.2.8 H.323 Events

MSG_H323_MISSING_PARAMETER

`EventText: ...`

Types: **Major, Minor, Warning, Information**

A parameter is missing from a message that was sent to a H.323 component. Activate appropriate H.323 analysis trace profile and attach trace and event log to error report.

MSG_H323_INVALID_PARAMETER_VALUE

`EventText: ...`

Types: **Major, Minor, Warning**

There is a parameter that exceeds the specified value range. Activate an appropriate H.323 analysis trace profile and attach the trace and event log to the error report.

MSG_H323_INVALID_CONFIGURATION

`EventText: ...`

Types: **Major, Warning**

The configuration for H.323 is wrong. Activate appropriate H.323 analysis trace profile and attach trace, event log and gateway config data to error report.

MSG_H323_UNEXPECTED_RETURN_VALUE

`EventText: ...`

Types: **Major, Minor, Warning**

The current function returns an unexpected result. Activate appropriate H.323 analysis trace profile and attach trace and event log to error report.

MSG_H323_INVALID_POINTER

`EventText: ...`

Types: **Major, Minor, Warning, Information**

This pointer contains an invalid value. Activate appropriate H.323 analysis trace profile and attach trace and event log to error report.

MSG_H323_INFORMATION

`EventText: ...`

Type: **Information**

This is for information purposes only.

MSG_H323_UNEXPECTED_MESSAGE

`EventText: ...`

Types: **Major, Minor, Warning**

H.323 protocol received an unexpected message. Activate appropriate H.323 analysis trace profile and attach trace and event log to error report.

MSG_H323_LOGIC_ERROR

`EventText: ...`

Types: **Major, Warning, Information**

A logical error was detected during message processing. Activate appropriate H.323 analysis trace profile and attach trace and event log to error report.

MSG_H323_STACK_ERROR

`EventText: ...`

Types: **Major, Minor, Warning, Information**

An error occurred during a H.323 stack operation. Activate an appropriate H.323 analysis trace profile and attach the trace and event log to the error report.

MSG_H323_PROTOCOL_ERROR

`EventText: ...`

Types: **Major, Minor, Warning, Information**

Protocol information missing or contains an error. Activate appropriate H.323 analysis trace profile and attach trace and event log to error report.

MSG_H323_OSCAR_NSD_ERROR

`EventText: ...`

Types: **Major, Minor, Warning, Information**

This error relates to non-standard data. Activate appropriate H.323 analysis trace profile and attach trace and event log to error report.

MSG_H323_SNMP_TRAP

`EventText: ...`

Types: **Major, Minor, Warning, Information**

This event indicates a situation that requires the attention of a service engineer. The service department should take measures in accordance with the event text (for example, perform a network check).

B.2.9 H.235 Events

MSG_CAT_H235

`EventText: H.235...`

Types: **Major, Warning, Information**

H.235 security related events. Verify H.235 configuration in gateway, gatekeeper and clients.

B.2.10 RTPQM Events

MSG_IP_RTP_QUALITY_FAILURE

`EventText: ...`

Type for this log entry: **Major**

The LAN quality for the specified destination IP address is classified as "too bad for voice calls". As a result, all further calls to that destination are routed over the line network. Call attempts for this destination are rejected by the gateway. Check the packet loss setting for IP traffic to this IP address.

`EventText: ...`

Type for this log entry: **Cleared**

The time for rejecting LAN calls for the specified IP destination address has elapsed. LAN calls to this destination address can be established again.

MSG_IP_RTP_QUALITY_WARNING

`EventText: ...`

Type: **Major**

This is a warning that LAN quality is deteriorating. The route to the specified destination address may soon be blocked. Check the packet loss setting for IP traffic to this IP address.

B.2.11 GSA Events

MSG_GSA_SNMP

`EventText: %p`

Type: **Critical**

Critical error for GSA which generates an SNMP trap.

B.2.12 DGW Events

MSG_BSD44_VCAPI_NO_LIST

`EventText: No listening socket for VCAPI`

Type: **Major**

Not possible to create a listening socket for VCAPI. LAN traffic not possible.

MSG_BSD44_DGW_NO_LIST

`EventText: No listening socket for DATA-GW`

Type: **Major**

Not possible to create a listening socket for DATAGWI. LAN traffic not possible.

MSG_BSD44_ACCEPT_DGW_ERR

`EventText: accept error for DATAGW Dispatcher`

Type: **Major**

Not possible to set up a new connection for DATAGW.

MSG_BSD44_DGW_SOCKET_FAIL

`EventText: DGW socket() failed`

Type: **Minor**

Client cannot retrieve a socket.

MSG_BSD44_DGW_BIND_FAIL

`EventText: DGW bind() failed`

Type: **Minor**

Client cannot bind a socket.

MSG_BSD44_DGW_CONNECT_FAIL

`EventText: DGW connect() failed`

Type: **Minor**

Client cannot connect to the server.

MSG_DGW_CONN_OUT_OF_RANGE

`EventText: dg_capi_HandleCapi20Msg: connection_id=%D out of range!`

Type: **Minor**

Connection ID exceeds the maximum allowed channels.

MSG_DGW_WRONG_STATE

`EventText: dg_capi_HandleCapi20Msg: id=%d wrong state!`

Type: **Minor**

Wrong state for DATAGW Dispatcher.

MSG_DGW_MSG_IGNORED

`EventText: %s from CAPI_PAYLOAD_IF ignored!`

Type: **Minor**

Message ignored because DGW Dispatcher in wrong state.

MSG_DGW_CONN_B3_ACT_IND

`EventText: ALLOC error: no more buffers`

Type: **Major**

Cannot allocate a buffer to send CONNECT_B3_ACTIVE_RESPONSE. The gateway performs an automatic restart.

MSG_DGW_DISC_B3_IND

`EventText: CAPI2_DISCONNECTB3_IND dreadful!: no more buffers`

Type: **Major**

Cannot allocate a buffer to send DGW_CLOSE_REQ. The gateway performs an automatic restart.

MSG_DGW_ALLOC_DISC_B3

`EventText: CAPI2_DISCONNECTB3_IND(2) dreadful!: no more buffers`

Type: **Major**

Cannot allocate a buffer to send DGW_FREE_REQ. The gateway performs an automatic restart.

MSG_DGW_UNHANDLED_MSG

`EventText: unhandled %s msg=%d from CAPI_PAYLOAD_IF`

Type: **Major**

Unknown message from CAPI_PAYLOAD_IF to DGW Dispatcher.

MSG_DGW_DATA_B3_ALLOC_ERR

`EventText: DATAB3_REQ:ALLOC ERROR: returncode %x`

Type: **Major**

Cannot allocate a buffer to send CMT_DATA_REQ to CAPI_PAYLOAD_IF. The gateway performs an automatic restart.

MSG_DGW_ALLOC_REQ_ERR

`EventText: DDGW_ALLOC_REQ received in wrong state!`

Type: **Minor**

DGW Dispatcher in wrong state when receiving DGW_ALLOC_REQ.

MSG_DGW_ALLOC_CONF_ERR

`EventText: DGW_ALLOC_CONF id=%d received in wrong state!`

Type: **Minor**

DGW Dispatcher in wrong state when receiving DGW_ALLOC_CONF.

MSG_DGW_FREE_ALLOC_ERR

`EventText: DGW_FREE_REQ: allocb failed!`

Type: **Major**

Cannot allocate a buffer to send DISCONNECT_B3_REQ. The gateway performs an automatic restart.

MSG_DGW_UNKNOWN_PRIMITIVE

`EventText: unknown capi primitive: %x`

Type: **Major**

Unknown message from CAPI_PAYLOAD_IF to DGW Dispatcher.

MSG_DGW_RECEIVE_ERR

```
EventText: Error while receiving message for DATAGW Dispatcher:returncode
%x
```

Type: **Major**

Receive error.

MSG_DGW_UNHANDLED_EVENT

`EventText: Unhandled event for DGW-Dispatcher,received event:%D`

Type: **Warning**

Unhandled event received by DGW Dispatcher.

MSG_DGW_WRONG_EVENT_CAPI20

`EventText: wrong eventcode from CAPI20-Mgr`

Type: **Warning**

CAPI20 Manager received the wrong event code.

MSG_DGW_NO_PLCI

`EventText: Find connection ID by PLCI:PLCI %d not found`

Type: **Warning**

Not possible to find connection ID because of wrong PLCI.

MSG_DGW_IND_ALLOC_ERR

`EventText: Not possible to allocate a buffer for CMT_DATA_IND`

Type: **Major**

Not possible to allocate a buffer for CMT_DATA_IND. The gateway performs an automatic restart.

MSG_DGW_CONF_ALLOC_ERR

`EventText: Not possible to allocate a buffer for CMT_DATA_CONF`

Type: **Major**

Not possible to allocate a buffer for CMT_DATA_CONF. The gateway performs an automatic restart.

MSG_DGW_WRONG_EVENT_CAPI

`EventText: wrong eventcode from CAPI_PAYLOAD_INTERFACE`

Type: **Warning**

Wrong event code from CAPI_PAYLOAD_INTERFACE.

MSG_DGW_ALLOC_CHN_RUN_OUT

`EventText: ALLOC_CHANNEL_REQ: run out of connection handles`

Type: **Minor**

Too many connections.

MSG_DGW_ALLOC_CHN_CONN_FAIL

`EventText: ALLOC_CHANNEL_REQ:connect failed`

Type: **Major**

Not possible to set up a new connection to the server.

MSG_DGW_OPEN_CHN_UNKNOWN_ID

`EventText: AOPEN_CHANNEL_REQ: unknown id`

Type: **Minor**

Connection ID not found using the channel ID.

MSG_DGW_OPEN_CHN_WRONG

`EventText: OPEN_CHANNEL_REQ:dreadful!: wrong state`

Type: **Minor**

Wrong state for message OPEN_CHANNEL_REQ.

MSG_DGW_OPEN_CHN_ALLOC_FAIL

`EventText: OPEN_CHANNEL_REQ:Alloc failed`

Type: **Major**

Not possible to allocate a buffer for DGW_OPEN_CONFIRM. The gateway performs an automatic restart.

MSG_DGW_FREE_UNKNOWN_ID

`EventText: FREE_CHANNEL_REQ : unknown connection_id`

Type: **Major**

FREE_CHANNEL_REQ with unknown ID.

MSG_DGW_FREE_CHN_ALLOC_FAIL

`EventText: FREE_CHANNEL_REQ : Alloc failed`

Type: **Major**

ALLOC for FREE_CHANNEL_REQ failed. Not possible to send DISCONNECT_B3_REQ. The gateway performs an automatic restart.

MSG_DGW_SEC_ALLOC_FAIL

```
EventText: FREE_CHANNEL_REQ : second Alloc failed
```

Type: **Major**

Second ALLOC for FREE_CHANNEL_REQ failed. Not possible to send DGW_FREE_REQ. The gateway performs an automatic restart.

MSG_DGW_UNH_MSG_CAPI20_MGR

```
EventText: unhandled message %d from CAPI20-Mgr
```

Type: **Warning**

Unknown message from CAPI2.0 Manager.

MSG_DGW_UNKNOWN_ID_CHANNEL

```
EventText: find_conn_id_by_chn_id: unknown id %D
```

Type: **Minor**

Connection ID cannot be found using channel ID.

MSG_DGW_FREE_NOT_SEND

```
EventText: Alloc error: DGW_FREE_REQUEST not sent
```

Type: **Major**

Alloc error: DGW_FREE_REQUEST not sent. The gateway performs an automatic restart.

MSG_DGW_DISC_B3_NOT_SEND

```
EventText: Alloc error:DISCONNECT_B3_REQUEST not sent
```

Type: **Major**

Alloc error: DISCONNECT_B3_REQUEST not sent. The gateway performs an automatic restart.

MSG_DGW_SOCKET_UNKNOWN

```
EventText: SO_NTFY_CONN_COMPLETE: unknown socket!
```

Type: **Minor**

SO_NTFY_CONN_COMPLETE: unknown socket. Connection will be closed.

MSG_DGW_CONNECT_FAILED

`EventText: SO_NTFY_CONN_COMPLETE: error! ret= %d!`

Type: **Major**

SO_NTFY_CONN_COMPLETE: connection error.

MSG_DGW_CONN_COMPL_ALLOC

`EventText: SO_NTFY_CONN_COMPLETE: Alloc failed`

Type: **Major**

No allocation request to remote.

MSG_DGW_CONN_RUN_OUT

`EventText: SO_NTFY_CONNECTION: run out of connection handles:cnt=%d`

Type: **Warning**

Too many connections.

MSG_DGW_MGR_NOT_READY

`EventText: SO_NTFY_CONNECTION: CAPI20Mgr  not ready:DGW_Disp_State=0x%x`

Type: **Warning**

SO_NTFY_CONNECTION: CAPI2.0 Manager not ready. Start operation message from CAPI2.0 Manager not received.

MSG_DGW_BUFAVAIL_SOCK_UNKN

`EventText: SO_NTFY_BUFAVAIL: unknown socket`

Type: **Minor**

Send not possible because socket unknown.

MSG_DGW_RCV_SOCK_UNKN

`EventText: SO_NTFY_RCV_SDATA: unknown socket`

Type: **Minor**

Data cannot be received because socket unknown.

MSG_DGW_ABORT_SOCK_UNKN

`EventText: SO_NTFY_ABORT: unknown socket`

Type: **Minor**

Connection cannot be received because of unknown socket.

MSG_DGW_UNKNOWN_NOTIFIC

`EventText: Unknown notification 0x%x`

Type: **Minor**

Unknown notification.

MSG_DGW_RCV_FAILED

`EventText: recv() failed, id=%d`

Type: **Minor**

Data not received correctly.

MSG_DGW_INV_MSG_LEN

`EventText: invalid message length: %d`

Type: **Minor**

Message with wrong length received from remote.

MSG_DGW_RCV_ALLOC_FAIL

`EventText: FATAL: allocb() failed, id=%d`

Type: **Major**

Not possible to allocate a receive buffer.

MSG_DGW_MSG_RCV_FAIL

`EventText: recv() failed, id=%d`

Type: **Minor**

Not possible to receive a message.

MSG_DGW_INVALID_LENGTH

`EventText: invalid length:%d %s`

Type: **Minor**

Wrong length received from remote.

MSG_DGW_INV_DATA_LEN

`EventText: invalid data length:%d`

Type: **Minor**

Wrong data length received from remote.

MSG_DGW_SEND_FAILED

`EventText: send() failed, id=%d`

Type: **Minor**

Not possible to send message to remote.

MSG_DGW_SEND_DATA_ERR

`EventText: send() data failed, id=%d`

Type: **Minor**

Not possible to send data to remote.

MSG_DGW_SOCKET_NOT_OPEN

`EventText: DGW socket not opened`

Type: **Major**

DGW socket not opened. No connections possible.

MSG_DGW_SOCKET_BIND_ERR

`EventText: bind error for DGW socket %d`

Type: **Major**

Bind error in DGW socket. No connections possible.

MSG_DGW_LISTENING_ERR

`EventText: listening error for DGW socket %d`

Type: **Major**

Listening error in DGW socket. No connections possible.

MSG_DGW_ACCEPT_FAILED

`EventText: so_accept() failed`

Type: **Minor**

No new connections accepted.

B.2.13 CAR Events

MSG_CAR_GENERAL_ERROR

`EventText: CAR : General error : %s`

Type: **Minor**

A generic error occurred in the CAR subsystem.

MSG_CAR_NO_MEMORY

`EventText: CAR : no more memory available`

Type: **Minor**

CAR: there is no more memory available.

MSG_CAR_FKT_GET_IPADR_FAILED

```
EventText: CAR : car_fkt_get_ipadr result unsuccessful due to lack of
memory (mat_allocb)
```

Type: **Minor**

`Car_fkt_get_ipadr` returns an unsuccessful result due to the fact that `mat_allocb` cannot reserve any memory anymore.

MSG_CAR_START_TCP_LISTENER_FAILED

```
EventText: CAR : SOH : start of TCP listener failed : returncode
soh_api_start_tcp_listener  = %d
```

Type: **Critical**

`soh_api_send_tcp_listener` returns an incorrect value. Starting the TCP listener failed.

MSG_CAR_SENDING_UPDATE_REQUEST_FAILED_SOH_ERROR

```
EventText: CAR : SOH : sending update request failed : returncode
soh_api_send_tcp_data = %d
```

Type: **Critical**

`soh_api_send_tcp_listener` returns an incorrect value. Sending the update request failed.

MSG_CAR_SENDING_UPDATE_REQUEST_FAILED_NO_MEMORY

`EventText: CAR : SOH : Start update failed due to lack of memory`

Type: **Minor**

CAR: SOH: sending the update request failed due to lack of memory.

MSG_CAR_UPDATE_NUMBER_OF_ENTRIES_CALLADDRTAB_TOO_BIG

`EventText: CAR : SOH : update data : number of CallAddressEntries = %d too big`

Type: **Minor**

CAR: SOH: the number of entries received by the update is too big. Possible SOH error.

MSG_CAR_SOH_MESSAGE_NOT_FROM_VENUS

`EventText: CAR : SOH : received message is not from the Venus server. Received IP address = 0x%x`

Type: **Major**

CAR: SOH: received message is not from the Venus server.

MSG_CAR_DB_READ_NODE_TABLE_ERROR

`EventText: CAR : DB : Read of Node Table failed : table index = %d`

Type: **Major**

CAR: DB: reading node table failed.

MSG_CAR_ALIVE_IP_CONNECTION_LOST

`EventText: CAR : Alive : ip connection %d.%d.%d.%d lost`

Type: **Major**

CAR: Alive: IP connection lost.

MSG_CAR_ALIVE_IP_CONNECTION_LOST

`EventText: CAR : Alive : ip connection %d.%d.%d.%d lost`

Type: **Major**

CAR: Alive: IP connection lost.

MSG_CAR_ALIVE_IP_CONNECTION_OK_AGAIN

`EventText: CAR: Alive : ip connection %d.%d.%d.%d ok again`

Type: **Information**

CAR: Alive: IP connection ok again.

MSG_CAR_ERROR_WITH_OAM_INTERFACE

`EventText: CAR : An error occurred with the OAM interface RC = %d`

Type: **Minor**

CAR: An error occurred on the OAM interface.

MSG_CAR_NO_FREE_CODEC_TAB_ELE

`EventText: No free table element for CODECs found`

Type: **Minor**

No free table element found for codecs.

MSG_CAR_CAN_NOT_ARRANGE_NODE_TAB

`EventText: Cannot arrange node table %d`

Type: **Major**

Node table cannot be arranged.

MSG_CAR_CAN_NOT_SORT_MAC_ADDRESS

`EventText: Cannot sort MAC addresses %s`

Type: **Minor**

MAC addresses cannot be sorted.

MSG_CAR_CODECS_INCONSISTENT

`EventText: HSA CODEC tables inconsistent %s`

Type: **Major**

The HSA CODEC tables are inconsistent.

MSG_CAR_WRONG_NODE_ID

`EventText: Wrong node id %d`

Type: **Major**

Wrong node identification.

MSG_CAR_WRONG_SERVICE

`EventText: Wrong service %d`

Type: **Minor**

Wrong service.

MSG_CAR_NODE_INFO_ALREADY_AVAILABLE

`EventText: Node info already available for %d`

Type: **Minor**

Node information for specified nodes is already available.

MSG_CAR_DBF_SERVER_INCONSISTENT

`EventText: DB feature server inconsistent %s`

Type: **Major**

The DB feature server is in an inconsistent state.

MSG_CAR_UNEXPECTED_MSG_RECV

`EventText: Unexpected message received %s`

Type: **Minor**

An unexpected message was received.

MSG_CAR_UNEXPECTED_DATA_RECV

`EventText: Unexpected data received %s`

Type: **Minor**

Unexpected data was received.

MSG_CAR_PARAM_NOT_FOUND

`EventText: Parameter not found %s`

Type: **Major**

Parameter not found.

MSG_CAR_WRONG_EVENT

`EventText: Wrong event received %x`

Type: **Major**

A wrong event was received.

MSG_CAR_WRONG_LENGTH

`EventText: Wrong length %d`

Type: **Minor**

Wrong length.

MSG_CAR_WRONG_IP_ADDRESS

`EventText: Wrong IP address %d.%d.%d.%d`

Type: **Major**

Wrong IP address.

MSG_CAR_UNAUTHORIZED_IP_ACCESS

`EventText: Unauthorized access from %d.%d.%d.%d`

Type: **Minor**

Unauthorized access from the specified IP address.

MSG_CAR_NO_MAC_ADDRESS

`EventText: No MAC address found`

Type: **Major**

MAC address not found.

MSG_CAR_DBFS_POSS_CONFLICT

`EventText: %s`

Type: **Warning**

Possible conflict.

MSG_CAR_CODEC_ENTRY_DELETED

`EventText: CODEC deleted for TableId %d, NodeId %d`

Type: **Major**

HSA CODEC Access deleted.

B.2.14 REG Events

MSG_REG_GLOBAL_ERROR

`EventText: REG : Global error : %s`

Type: **Minor**

REG: generic error.

MSG_REG_NO_MEMORY

`EventText: REG : No more memory available`

Type: **Minor**

REG: out of memory.

MSG_REG_SOH_SEND_DATA_FAILED

```
EventText: REG : SOH : send data failed :  returncode soh_api_send_tcp_data
= %d
```

Type: **Critical**

REG: SOH: send data failed: `soh_api_send_tcp_data` returned an incorrect return code.

MSG_REG_REQUEST_WITHIN_REGISTRATION

`EventText: REG : REG request within registration`

Type: **Minor**

REG: REG request within registration.

MSG_REG_NIL_PTR_FROM_SOH

`EventText: REG : NIL pointer received from SOH : Pointer = 0x%x`

Type: **Critical**

REG: NIL pointer (pointer with no address content) received from SOH.

MSG_REG_ERROR_FROM_SOH

`EventText: REG : SOH : error from SOH : errorcode = 0x%x`

Type: **Critical**

REG: SOH: error from SOH.

MSG_REG_SOH_UNKNOWN_EVENT_FROM_SOH

`EventText: REG : SOH : unknown event from SOH  0x%x`

Type: **Minor**

REG: SOH: unknown event from SOH.

MSG_REG_NO_REGISTRATION_POSSIBLE

`EventText: REG : No registration possible (no response)`

Type: **Major**

REG: no registration possible (no response).

B.2.15 NU Events

MSG_NU_GENERAL_ERROR

`EventText: General error %s`

Type: **Warning**

Only as a temporary dummy.

MSG_NU_TRANSPCONT_MISSING

`EventText: Transport container missing`

Type: **Major**

Transport container missing.

MSG_NU_NO_FREE_TRANSACTION

`EventText: No free transaction store found in %s`

Type: **Warning**

No free transaction store found in a function.

MSG_NU_INVALID_CIDL

`EventText: NCIDL invalid`

Type: **Major**

The CIDL sent in the message is invalid.

MSG_NU_CAR_FAILED

`EventText: Call to CAR function failed`

Type: **Major**

Call to CAR function failed. Wrong return code returned.

MSG_NU_CAR_RESP_INVALID

`EventText: Invalid Response from CAR: 0x%x`

Type: **Major**

Invalid response from CAR.

MSG_NU_UNEXPECTED_MSG

`EventText: Unexpected message: State:%d, Event:0x%x, Msgtype:0x%x`

Type: **Major**

Unexpected message in a certain NU state.

MSG_NU_UNEXPECTED_TIMER

`EventText: Timer unexpected: State: %d, Subind:0x%x`

Type: **Minor**

Unexpected timer event in a certain NU state.

MSG_NU_FREE_CHN_UNEXPECTED

`EventText: Free channel unexpected: State: %d`

Type: **Major**

Free channel unexpected in a certain NU state.

MSG_NU_FREE_CHN_COMF_TOO_LATE

`EventText: Free channel confirmation too late State: %d`

Type: **Major**

Free channel confirmation from the NU Leg control too late in certain NU state.

MSG_NU_EVENT_EXCEPTION

`EventText: Event exception: State: %d, Event:0x%x, Data:0x%x`

Type: **Minor**

Event exception in a certain NU state.

MSG_NU_WRONG_CALL_REF

`EventText: Wrong Call Reference. Event: 0x%x`

Type: **Major**

Wrong call reference from system or LAN.

MSG_NU_UNEXPECTED_SETUP

```
EventText: Unexpected SETUP: State:%d, Lwport/IPAddr:0x%x, CR:%d,
Direction:%d
```

Type: **Warning**

Unexpected SETUP on active transaction in a certain NU state. Might be caused by glare situations.

MSG_NU_NO_PORT_DATA

`EventText: No data for port_%d found in %s`

Type: **Major**

No data for a port found in a certain function.

MSG_NU_SUPERFLUOS_MSG

```
EventText: Superfluous message: Event:0x%x, Lwport:%d, Channel:%d,
Data:0x%x
```

Type: **Minor**

Superfluous message sent to NU. Might be caused by asynchronous behavior of the two nodes.

MSG_NU_IP_ERROR

`EventText: IP Error: IPAddress:0x%x, Error: 0x%x`

Type: **Minor**

IP error.

MSG_NU_UNKNOWN_MESSAGE

`EventText: Unknown message: Event:0x%x, Channel:%d`

Type: **Minor**

Unknown message sent to NU.

MSG_NU_INTERNAL_ERROR

`EventText: NU internal error: %s`

Type: **Minor**

NU Internal software error.

MSG_NU_TOO_MUCH_DIGITS

`EventText: Too many digits sent at a time`

Type: **Minor**

Too many digits sent at a time.

MSG_NU_TCP_LISTENER_FAILED

`EventText: Start_tcp_listener failed`

Type: **Critical**

The Socket Handler couldn’t start a listener function.

MSG_NU_SOH_RESP_INVALID

`EventText: SOH call back response invalid. Event:0x%x, Reason:%s`

Type: **Minor**

Parameters returned in the Socket Handler callback function invalid, or SOH error.

MSG_NU_DEV_TAB_NOT_FOUND

`EventText: Device table not found`

Type: **Major**

Access to the device table not ok.

B.2.16 NU Leg Control Events

MSG_NULC_MESSAGE_ERROR

```
EventText: Unexpected message ID or eventcode (%x)
           %x = message type
```

Type: **Warning**

Received unexpected or unknown message.

MSG_NULC_PARAM_ERROR

```
EventText: Missing/not valid parameter %s in message %s
           %s = name of either parameter or message
```

Type: **Major**

Mandatory parameter missing or contains an invalid value.

MSG_NULC_MEMORY_ERROR

```
EventText: EventText: Can’t access/allocate memory
```

Type: **Major**

Application did not receive the requested memory, or another operation returned a null pointer.

MSG_NULC_INTERNAL_ERROR

```
EventText: %s
```

Type: **Major**

Internal error in NU Leg control.

MSG_NULC_INTERNAL_EVENT

```
EventText: %s
```

Type: **Information**

Successful startup or shutdown of application.

B.2.17 HFA Manager Events

MSG_HFAM_HAH_ALLOC_CHAN_ERR

```
EventText: tried to allocate channel for client that is not in idle state
```

Type: **Major**

An attempt was made to seize a channel for a client that is not idle. Internal error in HFA Manager.

MSG_HFAM_HAH_ALLOC_CONF_ERR

`EventText: HFAM_ALLOCATE_CHANNEL_CONF received from client that is not in allocating or opening state`

Type: **Major**

`HFAM_OPEN_CHANNEL_CONF` received from client that is not in opening state. HFAA error.

MSG_HFAM_MAIN_UNEXP_LWEVENT_ERR

`EventText: unknown/unexpected event code received: lw_event`

Type: **Major**

Unknown/unexpected event code received: `lw_event`. System-side DH/CP error.

MSG_HFAM_MAIN_ILLEG_PORTNO_ERR

`EventText: Illegal port no with event code`

Type: **Major**

Illegal port number with event code. Check system.

MSG_HFAM_MAIN_NO_LOGONTIMER_ERR

`EventText: No logon timer started for that client`

Type: **Major**

A logon timer was not started for the client. Internal error in the HFA Manager.

MSG_HFAM_LIH_CREATE_REGISOCK_ERR

`EventText: Could not create registration socket`

Type: **Critical**

Could not create registration socket. LAN-side error.

MSG_HFAM_LIH_SOCK_REUSE_ADR_ERR

`EventText: Could not set socket option ’reuse address`

Type: **Critical**

Could not set socket option "reuse Address". LAN-side error.

MSG_HFAM_LIH_BIND_REGISOCK_ERR

`EventText: Could not bind registration socket`

Type: **Critical**

Could not bind registration socket. LAN-side error.

MSG_HFAM_LIH_LISTEN_REGISOCK_ERR

`EventText: Could not listen at registration socket`

Type: **Critical**

Could not listen at registration socket. LAN-side error.

MSG_HFAM_LIH_ACCEPT_TCPIP_CON_ERR

`EventText: Could not accept TCP/IP connection from client`

Type: **Critical**

Could not accept TCP/IP connection from client. LAN-side error. Check client setup.

MSG_HFAM_LIH_ACCEPT_CLIENT_CON_ERR

`EventText: Could not accept TCP/IP connection from client`

Type: **Major**

Connection from client not accepted. LAN-side error. Check client setup.

MSG_HFAM_LIH_MAX_CON_EXCEED_ERR

`EventText: max no.(HFAM_MAX_CONNECTIONS) of TCP/IP connections exceeded`

Type: **Major**

Maximum number (`HFAM_MAX_CONNECTIONS`) of TCP/IP connections exceeded. Internal error in the HFA Manager.

MSG_HFAM_LIH_ACCEPT_INETOA_CON_ERR

`EventText: Cannot accept connection from client`

Type: **Major**

Cannot accept connection from client. LAN-side error. Check client setup.

MSG_HFAM_LIH_SOCK_WOULDBLOCK_ERR

`EventText: CSocket would block: no data -> ignore`

Type: **Minor**

Socket would block: no data. Ignore. LAN-side error.

MSG_HFAM_LIH_TCDATAGRAM_RCV_ERR

`EventText: TC_DATAGRAM received from client->subscriber_no while not in logged_in state, discarded`

Type: **Minor**

TC_DATAGRAM received from client->subscriber number, although not logged on. Discarded. LAN-side error. Check client setup.

MSG_HFAM_LIH_UNEXP_CORNET_ERR

`EventText: unknown/unexpected Cornet-TS message received from client`

Type: **Minor**

Unknown/unexpected CorNet-TS message received from client. Check client

MSG_HFAM_LIH_IPADR_TOO_LONG_ERR

`EventText: IP-address too long, cut !`

Type: **Major**

IP address was too long and was cut. Check client setup.

MSG_HFAM_LIH_SUBNO_TOO_LONG_ERR

`EventText: SubNo too long, cut !`

Type: **Major**

Subscriber number was too long and was cut. Check client setup.

MSG_HFAM_LIH_ALGORITM_OBJID_ERR

`EventText: SubNo too long, cut !`

Type: **Major**

Algorithm object ID was too long and was cut. Check client setup.

MSG_HFAM_LIH_PROTOCOL_LIST_ERR

`EventText: too many elements in protocol list`

Type: **Major**

Too many elements in the protocol list. Check client setup.

MSG_HFAM_LIH_RETURNED_SOCKET_ERR

`EventText: returned socket error`

Type: **Major**

Returned socket error. LAN-side error.

MSG_HFAM_SIH_NO_LOGIN_TIMER_ERR

`EventText: timeslot is valid`

Type: **Major**

Login timer for a client could not be started. Start HFA Manager.

MSG_HFAM_SIH_INVAL_TSLOT_PARAM_ERR

`EventText: Input Parameter for hfam_sih_send_ts invalid`

Type: **Major**

Input parameter for `hfam_sih_send_ts` invalid. System-side error.

MSG_HFAM_SIH_CORNET_LONGER_28_ERR

`EventText: cannot synthesize CorNet-TS message longer than 28 bytes`

Type: **Major**

Cannot synthesize CorNet-TS messages longer than 28 bytes. System-side error.

MSG_HFAM_MON_NO_MON_TIMER_ERR

`EventText: No monitor timer !`

Type: **Minor**

No monitor timer. Start HFA Manager.

MSG_HFAM_REG_LOGIN_NOTREG_ERR

```
EventText: DL_LOGON_IN received for client not in not_registered state,
subno
```

Type: **Minor**

`DL_LOGON_IN` received for client not in registered state. HFA Manager-internal.

MSG_HFAM_REG_SUBNO_TOO_LONG_ERR

`EventText: DL_LOGON_IN received for client not in not_registered state`

Type: **Major**

SubNo in `DL_LOGON_IN` too long and was cut. Check client setup in system.

MSG_HFAM_REG_SUBNO_NOTCONFIG_ERR

`EventText: SubNo from System I/F not found in config data`

Type: **Minor**

SubNo from system I/F not found in config data. Check client setup in system.

MSG_HFAM_REG_ESTAB_NOTREG_ERR

`EventText: DL_EST_IN arrived for client not in registered state`

Type: **Minor**

`DL_EST_IN` received for the client not in registered state. Check system setup or WBM.

MSG_HFAM_REG_RELIN_NOTREG_ERR

`EventText: DL_REL_IN arrived for client not in registered state`

Type: **Minor**

`DL_REL_IN` received for the client not in registered state. Check system setup or WBM.

MSG_HFAM_REG_MISSING_L2INFO_ERR

`EventText: missing L2addr-InfoElem, no IP address`

Type: **Minor**

`L2addr-InfoElem` missing, no IP address. Check system setup or WBM.

MSG_HFAM_REG_LOGON_REJECT_ERR

`EventText: logon of client->subscriber_no rejected`

Type: **Information**

Logon of client subscriber number was rejected. Check system setup.

MSG_HFAM_REG_INVAL_PWD_LEN_ERR

`EventText: invalid password length of <sub_number>, no hash`

Type: **Minor**

Invalid password length for <sub_number>, no hash. Check client setup or WBM.

B.2.18 HFA Adapter Events

MSG_HFAA_MESSAGE_ERROR

`EventText: Unexpected message ID or eventcode (%x)`

Type: **Warning**

Received unexpected or unknown message.

MSG_HFAA_PARAM_ERROR

`EventText: Missing/not valid parameter %s in message %s`

Type: **Major**

Mandatory parameter missing or contains an invalid value.

MSG_HFAA_MEMORY_ERROR

`EventText: Can't access to/allocate memory`

Type: **Major**

Application doesn’t get requested memory or constructor returns null pointer.

MSG_HFAA_INTERNAL_ERROR

`EventText: %s`

Type: **Major**

Internal error in HFA Adapter.

MSG_HFAA_INTERNAL_EVENT

`EventText: %s`

Type: **Information**

Successful startup or shutdown of application.

B.2.19 PPP Call Control Events

None implemented at the moment.

B.2.20 PPP MANAGER Events

MSG_PPPM_ERR_CONFIG

`EventText: %p`

Types: **Critical, Major, Minor**

Inconsistency in configuration data. Error in Admin receiver. Examine configuration data for PPP systematically. Inform Software Development Department, provide the trace files (PPPM_TBAS, PPPM_TSTD, PPPM_TEXT Level 9) that document this corrupt behavior.

MSG_PPPM_ERR_OPERATION

`EventText: %p`

Types: **Critical, Major, Minor**

Unexpected condition during operation. Inform Software Development Department, provide the trace files (PPPM_TBAS, PPPM_TSTD, PPPM_TEXT Level 9) that document this corrupt behavior.

B.2.21 PPP Stack Events

MSG_PPP_STACK_PROC

`EventText: %p`

Types: **Major, Minor, Warning**

Internal PPP stack processing error. Inform Software Development Department, provide the trace files (PPP_STACK_PROC Level 6 and PPP_STACK_DBG_IF Level 9) that document this corrupt behavior.

B.2.22 VCAPI Events

MSG_BSD44_SELECT_ERROR

`EventText: Select error for VCAPI & DATAGW Dispatcher`

Type: **Major**

Sockets for VCAPI and DATAGW clients not working anymore.

MSG_BSD44_ACCEPT_ERROR

`EventText: Accept error for VCAPI Dispatcher`

Type: **Major**

Not possible to set up a new connection for VCAPI.

MSG_VCAPI_NO_CAPI_DATA

`EventText: No CAPI data in message with event 0x%x`

Type: **Minor**

No data in the message received from VCAPI server or from `CAPI_PAYLOAD_INT`.

MSG_VCAPI_WRONG_LINKNUM

`EventText: Wrong link number %d in message %s`

Type: **Minor**

Wrong link number in the message received from VCAPI server or from `CAPI_PAYLOAD_INT`.

MSG_VCAPI_LINK_TABLE_FULL

`EventText: No free element found in VS_Plci_Link table`

Type: **Major**

Too many physical link connections are not released correctly.

MSG_VCAPI_NO_PLCI

`EventText: PLCI not found in VS_Plci_Link table (to find message_nbr)`

Type: **Major**

PLCI not found in `VS_Plci_Link` (needed to find `message_nbr`).

MSG_VCAPI_CONV_H2N_ERROR

`EventText: Conversion error:%d`

Type: **Minor**

Message to client is not converted correctly.

MSG_VCAPI_CONV_H2N_FAILED

`EventText: Conversion for %s returns %d,expected %d`

Type: **Minor**

Conversion returns wrong value.

MSG_VCAPI_WRONG_CONV_H2N

`EventText: Wrong conversion for %s`

Type: **Minor**

Message not converted (wrong message).

MSG_VCAPI_WRONG_MSG_LENGTH

`EventText: Wrong message length %d`

Type: **Minor**

The total length of the CAPI message is wrong.

MSG_VCAPI_CONV_N2H_FAILED

`EventText: Conversion for %s returns %d,expected %d)`

Type: **Minor**

Conversion returns wrong value.

MSG_VCAPI_WRONG_CONV_N2H

`EventText: Wrong conversion for %s`

Type: **Minor**

Message not converted (wrong message).

MSG_VCAPI_UNKNOWN_MSG_N2H

`EventText: unknown msg %s`

Type: **Minor**

Wrong subcommand in message.

MSG_VCAPI_TOO_MANY_CLIENTS

`EventText: Too many clients connected`

Type: **Warning**

No free element found in the connection table. Connection will be closed.

MSG_VCAPI_ACCEPT_ERROR

`EventText: Accept error for VCAPI Dispatcher`

Type: **Major**

Not possible to set up a new connection for VCAPI.

MSG_VCAPI_DISP_NOT_READY

`EventText: VCAPI Dispatcher not ready`

Type: **Major**

The VCAPI server did not send `VCAPI_EVENT_START_OPERATION_REQ` to the dispatcher.

MSG_VCAPI_NO_CLIENT

`EventText: no client address`

Type: **Minor**

No client address.

MSG_VCAPI_WRONG_BUF_LEN

`EventText: Wrong buffer length %d`

Type: **Minor**

Buffer length not within the message limits.

MSG_VCAPI_NO_RCV_BUFFER

`EventText: rcvBufPP=0x%x null`

Type: **Minor**

Receive buffer either already cleared or not possible to allocate memory.

MSG_VCAPI_NO_ALLOC_SINGLE

`EventText: Not possible to allocate a single buffer`

Type: **Minor**

Not possible to get a single receive buffer (allocation error).

MSG_VCAPI_NO_ALLOC_EXTENDED

`EventText: Not possible to allocate an extended buffer`

Type: **Major**

Not possible to get an extended receive buffer (allocation error). The gateway performs an automatic restart.

MSG_VCAPI_BUF_NOT_CREATED

`EventText: Not possible to create buffer with size:%d`

Type: **Major**

Not possible to create buffer with the expected length.

MSG_VCAPI_NO_NEW_BUF

`EventText: No new buffer created by vs_bputd`

Type: **Major**

Not possible to create a new buffer to store the received data (allocation error). The gateway performs an automatic restart.

MSG_VCAPI_DATA_NOT_STORED

`EventText: Not possible to get a receive buffer,data not stored`

Type: **Major**

Received data not stored because new buffer could not be allocated (allocation error). The gateway performs an automatic restart.

MSG_VCAPI_SOCKET_NOT_OPEN

`EventText: VCAPI-Socket not opened`

Type: **Major**

Socket couldn’t be opened (connections with clients not possible).

MSG_VCAPI_SOCKET_BIND_ERR

`EventText: bind error for socket %d`

Type: **Major**

Bind error for VCAPI socket (connections with clients not possible).

MSG_VCAPI_LISTENING_ERR

`EventText: listening error for socket %d`

Type: **Major**

Not possible to create a listening VCAPI socket (connections with clients not possible).

MSG_VCAPI_RECEIVE_ERR

`EventText: Error while receiving message for VCAPI Dispatcher:Returncode %x`

Type: **Minor**

Error while receiving message for VCAPI Dispatcher.

MSG_VCAPI_NO_ALLOC_MSG

`EventText: Not possible to allocate a buffer`

Type: **Major**

Not possible to send a message to VCAPI Dispatcher because no buffer could be allocated (allocation error). The gateway performs an automatic restart.

MSG_VCAPI_WRONG_EVENT_SRV

`EventText: wrong eventcode from VCAPI_SERVER`

Type: **Warning**

VCAPI Dispatcher has received wrong event from VCAPI server.

MSG_VCAPI_PLCI_NOT_FOUND

`EventText: PLCI not found in VS_Plci_Link table`

Type: **Minor**

PLCI not found in `VS_Plci_Link` table when receiving a message from `CAPI_PAYLOAD_IF`.

MSG_VCAPI_IND_ALLOC_ERR

`EventText: Not possible to allocate a buffer for CMT_DATA_IND`

Type: **Major**

Not possible to allocate a buffer for `CMT_DATA_IND`. Message cannot be sent to client. The gateway performs an automatic restart.

MSG_VCAPI_CONF_ALLOC_ERR

`EventText: Not possible to allocate a buffer for CMT_DATA_CONF`

Type: **Major**

Not possible to allocate a buffer for `CMT_DATA_CONF`. Message cannot be sent to client. The gateway performs an automatic restart.

MSG_VCAPI_WRONG_EVENT_CAPI

`EventText: Nwrong eventcode from CAPI_PAYLOAD_INTERFACE`

Type: **Warning**

VCAPI Dispatcher has received wrong event from `CAPI_PAYLOAD_IF`.

MSG_VCAPI_WRONG_LENGTH_MSG

`EventText: Wrong message length %d`

Type: **Warning**

Length of message from client to VCAPI server/`CAPI_PAYLOAD_IF` is incorrect.

MSG_VCAPI_NO_PLCI_DATA_B3

`EventText: PLCI not found in VS_Plci_Link table (for DATA_B3_REQ)`

Type: **Minor**

PLCI not found in `VS_Plci_Link` table (for `DATA_B3_REQ`). Message cannot be sent to `CAPI_PAYLOAD_IF`.

MSG_VCAPI_DATA_B3_ALLOC_ERR

`EventText: ALLOC ERROR: returncode %x`

Type: **Major**

Not possible to get a buffer to send the `DATA_B3_REQ` message to `CAPI_PAYLOAD_IF` (allocation error). The gateway performs an automatic restart.

MSG_VCAPI_NO_PLCI_DISCONNECT

```
EventText: PLCI Element not found in VS_Plci_Link table for
DISCONNECT_RESPONSE
```

Type: **Minor**

PLCI element not found in `VS_Plci_Link` table for the `DISCONNECT_RESPONSE` message.

MSG_VCAPI_MSG_NOT_SEND

`EventText: Not possible to send message`

Type: **Warning**

Not possible to send a message. Interface to `CAPI_PAYLOAD` returns -1.

MSG_VCAPI_NO_LIST_SOCKET

`EventText: no listening socket stored in connection table`

Type: **Major**

No listening socket stored in connection table. A new connection cannot be opened.

MSG_VCAPI_RCV_LEN_ERR

`EventText: Wrong message length at receive data from client`

Type: **Warning**

Wrong message length on receipt of data from client. Connection will be closed. Message is not sent to VCAPI server.

MSG_VCAPI_SOCKET_RCV_ERR

`EventText: Error on receiving data from the Socket (connection interrupted)`

Type: **Warning**

Connection has been interrupted causing an error on receipt of data.

MSG_VCAPI_SOCK_NOT_AVAIL

`EventText: connected socket not stored in connection table`

Type: **Minor**

Connected socket not stored in connection table. Not possible to receive data.

MSG_VCAPI_UNKNOWN_NTFY

`EventText: Unknown notification. Used value:%d`

Type: **Warning**

Unknown notification.

MSG_VCAPI_NO_LNK_CONN

`EventText: Link number not found in connection table`

Type: **Minor**

Link number not found in connection table.

B.2.23 VCAPI Application Events

MSG_VCAPI_SERVER_ERROR

`EventText: VCAPI Server error: %p`

Type: **Warning**

Various VCAPI Server errors from the HXG2 code.

MSG_VCAPI_UNANTICIPATED_MESSAGE

`EventText: Unanticipated Message %s for CSID %s in state %s`

Type: **Warning**

The CAPI Manager has received an unanticipated message for the current state of the relevant CAPI object.

MSG_VCAPI_UNANTICIPATED_CAPI_MESSAGE

`EventText: Unanticipated CAPI message %s`

Type: **Warning**

The CAPI Manager has received an unanticipated CAPI message with an unknown command and subcommand.

MSG_VCAPI_UNANTICIPATED_DISP_MESSAGE

`EventText: Unanticipated VCAPI Dispatcher message %d`

Type: **Warning**

The VCAPI Server has received a VCAPI Dispatcher message with an unknown event.

MSG_VCAPI_UNANTICIPATED_MESSAGE_BASE

`EventText: Unanticipated Message Base %m`

Type: **Warning**

The VCAPI Server, the VCAPI Interface or CAPI Manager has received a message base with an unanticipated ID.

MSG_VCAPI_MESSAGE_LENGTH_TOO_SHORT

`EventText: Part of the CAPI Message is missing (%d > %d)`

Type: **Warning**

The length of the CAPI message is greater than the size of the VB string containing this CAPI message.

MSG_VCAPI_MSGBASE_WITHOUT_CAPIMSG

`EventText: Message Base without CAPI message`

Type: **Warning**

The VCAPI Server, the VCAPI Interface or the CAPI Manager has received a `CapiInd` or `CapiReq` not containing the required CAPI message.

MSG_VCAPI_MSGBASE_WITHOUT_DATAGWMSG

`EventText: MMessage Base without Data GW message`

Type: **Warning**

The CAPI Manager has received a message base not containing the required VCAPI Dispatcher message from NU or from the Data GW dispatcher.

MSG_VCAPI_MSGBASE_WITHOUT_DISPMSG

`EventText: Message Base without VCAPI Dispatcher message`

Type: **Warning**

The VCAPI Server has received a message base not containing the required VCAPI Dispatcher message from the VCAPI Dispatcher.

MSG_VCAPI_ILLEGAL_LINK_NUMBER

`EventText: Illegal link number: %d`

Type: **Warning**

An attempt was made to address a member of the dynamic link table with an illegal index.

MSG_VCAPI_ILLEGAL_PARTNER_NUMBER

`EventText: Illegal partner number: %d`

Type: **Warning**

An attempt was made to address the info of a non-allocated VCAPI partner.

MSG_VCAPI_ADD_OBJECT_FAILED

`EventText: Could not add a CAPI object to the managed object list`

Type: **Major**

A newly created CAPI object could not be added to the managed object list. The gateway performs an automatic restart.

MSG_VCAPI_COULD_NOT_CREATE_OBJECT

`EventText: Could not create a CAPI object`

Type: **Warning**

A new CAPI object could not be created.

MSG_VCAPI_COULD_NOT_DELETE_OBJECT

`EventText: Could not delete a CAPI object`

Type: **Major**

The specified CAPI object could not be deleted. The gateway performs an automatic restart.

MSG_VCAPI_NO_PLCI_AVAILABLE

`EventText: No PLCI available`

Type: **Warning**

All available PLCIs are seized.

MSG_VCAPI_CSID_MISSING

`EventText: CSID is missing`

Type: **Warning**

The CAPI Manager has received a message from NU or from CCP that doesn’t contain a call and session ID.

MSG_VCAPI_COULD_NOT_FIND_PLCI

`EventText: Could not find the corresponding PLCI`

Type: **Warning**

The PLCI belonging to a given call and session ID or to a given channel ID could not be found.

MSG_VCAPI_COULD_NOT_FIND_OBJECT

`EventText: Could not find the corresponding CAPI Object`

Type: **Warning**

The CAPI object belonging to a given call and session ID could not be found.

MSG_VCAPI_COULD_NOT_FIND_CSID

`EventText: Could not find the corresponding CSID`

Type: **Warning**

The call and session ID belonging to a given PLCI could not be found.

MSG_VCAPI_COULD_NOT_STORE_REQ

`EventText: Could not store the request %x %x for PLCI %d`

Type: **Major**

No more space available in the CAPI interface to store the request. The gateway performs an automatic restart.

MSG_VCAPI_CONF_WITHOUT_REQ

`EventText: Confirmation %x %x for PLCI %d without stored Request`

Type: **Warning**

The CAPI interface has received a confirmation without the relevant stored request.

B.2.24 H.323 Client Events

MSG_H323CLIENT_INVALID_CLIENTID

`EventText: invalid Peer ID: %d`

Type: **Major**

Software error: index of client table incorrect. Stop the H323Client-Internal trace profile.

MSG_H323CLIENT_INVALID_ADMIN_MSG

`EventText: invalid admin message for file %s received`

Type: **Minor**

Error received while reading/writing configuration files. Stop the H323Client-Internal trace profile.

MSG_H323CLIENT_NWRS_ENTRY_FAILED

`EventText: create %s entry failed for client (%I, %I)`

Type: **Major**

Creation of the NWRS entry failed. Stop the H323Client-Internal trace profile.

MSG_H323CLIENT_INVALID_PARAM

`EventText: invalid parameter %s, value %x`

Type: **Major**

Software error: invalid parameter. Stop the H323Client-Internal trace profile.

MSG_H323CLIENT_MAPS_DIFFER

`EventText: size of maps differ (call no: %I, IP: %I)`

Type: **Major**

Software error: invalid parameter. Stop the H323Client-Internal trace profile.

B.2.25 IPNC Events

MSG_IPNC_MESSAGE_ERROR

`EventText: message error: %s`

Type: **Major**

Unexpected message received - will be ignored. Stop the IPNC-Std trace profile.

MSG_IPNC_MESSAGE_DUMP

`EventText: message error: %s% M`

Type: **Major**

Unexpected message received - will be ignored. Stop the IPNC-Std trace profile.

MSG_IPNC_PARAM_ERROR

`EventText: message parameter error: %s %x`

Type: **Major**

Message with invalid parameter received - will be ignored. Stop the IPNC-Std trace profile.

MSG_IPNC_INTERNAL_ERROR

```
EventText: internal error: %I
```

Type: **Major**

Software error: invalid internal data detected. Stop the IPNC-Detailed trace profile.

MSG_IPNC_INCONSISTENT_STATE

```
EventText: inconsistent internal state: %s %x
```

Type: **Major**

Software error: data became inconsistent during processing. Stop the IPNC-Std trace profile.

MSG_IPNC_CP_ASYNCH

```
EventText: CP and IPNC asynchronous: %s %s
```

Type: **Major**

Asynchronism between states of HiPath-CP and IPNC detected. Stop the IPNC-Std trace profile.

B.2.26 IPNCA Events

MSG_IPNCA_ERROR

```
EventText: IPNC Adapter: (some)  Error description ("IPNC Adapter: %s")
```

Type: **Minor**

A minor error has occurred.

B.2.27 MPH Events

MSG_MPH_INFO

```
EventText: %p
           SGP Message not sent
```

Type: **Information**

Event log for all MPH events. SGP message cannot be sent to IPNC.

B.2.28 OAM Events

MSG_TLS_MUTEX_BLOCKED

`EventText: Mutex blocked`

Type: **Major**

Software error: deadlock. Reboot the gateway; create error report.

MSG_DISP_SENDER_NOT_SET

`EventText: Sender not set in message: %n%M`

Type: **Critical**

Internal software error. Message header not set. Event is always followed by an ASSERT event, which causes an automatic reboot.

MSG_OAM_TIMESYNC

`EventText: Time Synchronization from %s to %s`

Type: **Information**

Time synchronization took place.

MSG_OAM_TIMESYNC_FAILED

`EventText: Time Synchronization failed`

Type: **Warning**

Time synchronization not performed.

MSG_OAM_PRIO_INCREASED

`EventText: Priority of %s increased`

Type: **Warning**

Priority of an OAM task (trace, event, OAM) was increased because of heavy load. This is still valid behavior.

MSG_OAM_PRIO_SWITCHED_BACK

`EventText: Priority of %s switched back. OAM Msg Queue OK`

Type: **Cleared**

Priority of an OAM task (trace, event, OAM) was decreased because the heavy load no longer exists. This is still valid behavior.

MSG_OAM_QUEUE_FULL

`EventText: POAM Msg Queue (%s) full. Remove Messages`

Type: **Major**

Queue of OAM tasks (trace, event, OAM) full. All messages are removed. See Section 6.6.2.3, "Board Overload Caused by Trace Information".

MSG_OAM_PUT_TO_QUEUE_FAILED

`EventText: Put to OAM Msg Queue (%s) failed. Remove Message`

Type: **Major**

The addition of OAM tasks (trace, event, OAM) to the message queue failed for no apparent reason. All messages are removed.

MSG_OAM_QUEUE_BLOCKED

`EventText: Put to OAM Msg Queue (%s) failed. Queue blocked. Remove Message`

Type: **Major**

The addition of OAM tasks (trace, event, OAM) to the message queue failed. Reason: queue blocked. All messages are removed.

MSG_OAM_INTERNAL_EVENT

`EventText: %p`

Type: **Warning**

Execution of an automatic action failed.

MSG_ADMIN_LOGGED_IN

`EventText: %s user \"%s\" (session id = %d) logged in`

Type: **Information**

Information about successful administrator login.

MSG_ADMIN_SESSION_CREATED

`EventText: %s session created for user \"%s\" (session id = %d)`

Type: **Information**

A session for an administrator or an automatic login procedure (such as AutoDiscovery or data transfer from HiPath to HG 1500) was created.

MSG_ADMIN_LOGGED_OUT

`EventText: %s user \"%s\" (session id = %d) logged out`

Type: **Information**

Information about successful administrator login.

MSG_ADMIN_INVALID_LOGIN

`EventText: Invalid login from %s (user \"%s\")`

Type: **Information**

Invalid login attempt.

MSG_ADMIN_SESSION_EXPIRED

`EventText: Session id = %d of user \"%s\" expired`

Type: **Information**

Session expired (session timeout reached). New login necessary.

MSG_ADMIN_GOT_WRITE_ACCESS

`EventText: %s user \"%s\" (session id = %d) got write access`

Type: **Information**

Administrator has write access. He can therefore change the gateway configuration.

MSG_ADMIN_DIDNT_GET_WRITE_ACCESS

`EventText: %s user \"%s\" (session id = %d) didn’t get write access`

Type: **Information**

Administrator has not been granted write access. Another administrator already has write access. Wait for or force write access (for example, via WBM).

MSG_ADMIN_RELEASED_WRITE_ACCESS

`EventText: %s user \"%s\" (session id = %d) released write access`

Type: **Information**

An administrator has released write access and cannot perform any more changes on the gateway configuration. Now other administrators can be granted write access.

MSG_ADMIN_FORCE_RELEASE_WRITE_ACCESS

`EventText: %s user \"%s\" (session id = %d) released write access`

Type: **Information**

The current administrator was forced to release write access because another administrator took over write access. The gateway can now be changed by the other administrator only.

MSG_CAR_CALL_ADDR_REJECTED

`EventText: Call address rejected %s`

Type: **Minor**

The specified call address was rejected.

MSG_WEBSERVER_INTERNAL_ERROR

`EventText: %p`

Type: **Warning**

Internal error on the web server, internal exception situation which does not impact other web server activities however.

B.2.29 CLI Events

MSG_CLI_TELNET_ABORTED

`EventText: Telnet client \"%s\" aborted`

Type: **Warning**

Telnet client disconnected before logging in.

MSG_CLI_LOGGED_IN_FROM_TELNET

```
EventText: User \"%s\" logged in (session id = %d) from telnet CLI with IP
address %s
```

Type: **Information**

Telnet client successfully logged in.

MSG_CLI_LOGGED_IN_FROM_V24

`EventText: User \"%s\" logged in (session id = %d) from V24 CLI`

Type: **Information**

V24 user successfully logged in.

B.2.30 Licence Management Events

MSG_LIC_DATA_ACCEPTED

`EventText: license data accepted and loaded`

Type: **Information**

HiPath 3000 V1.0/V3.0: during startup of the license management component the license data in the persistent file licmgmt.txt is checked against the MAC address. This event appears if the license data is correct.
An SNMP trap is generated.
HiPath 3000/5000 V5.0: this event appears if the license manager receives changed license data via system interface (SI) and if the data could be encrypted without error. An event is not triggered if the system interface sends unchanged license data to the license manager.
An SNMP trap is generated.

MSG_LIC_DATA_NOT_ACCEPTED

`EventText: license data not accepted`

Type: **Information**

HiPath 3000 V1.0/V3.0: this event appears if a false license key was entered during an attempt to enter license data via WBM.
This event is not used in HiPath 3000/5000 V5.0.

MSG_LIC_DATA_CORRUPTED

`EventText: license data are corrupted and set back to default values`

Type: **Critical**

HiPath 3000 V1.0/V3.0: during startup of the license management component the license data in the persistent file licmgmt.txt is checked against the MAC address. If the license data is not correct, the license file is corrupt. The license manager attempts to load the default data.
An SNMP trap is generated.
Enter the license data with the correct license key.
HiPath 3000/5000 V5.0: this event appears if the license manager receives changed license

data via system interface (SI) and if this data could not be encrypted.
An SNMP trap is generated.
Enter the license data with the correct license key via HiPath 3000 Manager E.

MSG_LIC_DATA_REDUCED

`EventText: License feature %s is reduced to %d licenses`

Type: **Information**

This event appears if the license manager detects a reduction in the number of licenses. An SNMP trap is generated.

MSG_LIC_DATA_VERSION_MISMATCH

`EventText: Encryption versions are no longer valid`

Type: **Critical**

This event appears if the AES or hash versions no longer match. An SNMP trap is generated. The license data is reset to default values. Update software with new encryption versions.

B.2.31 HIP Events

MSG_HIP_ALLOC_DEV_OBJ

`EventText: hi_main: Device allocation memory not possible`

Type: **Warning**

No heap space for device data. Check available memory.

MSG_HIP_NO_MEM_CLBLK

`EventText: hi_main: No memory for Cluster block available`

Type: **Warning**

No space available for cluster block. Check why no allocatable memory is available in the gateway.

MSG_HIP_NO_MEM_CL

`EventText: hi_main: No memory for Cluster %d  available`

Type: **Warning**

No space available for cluster. Check why no allocatable memory is available in the gateway.

MSG_HIP_NO_NETPOOL_INIT

`EventText: NETPOOL INIT not possible: Return value %d`

Type: **Warning**

Initialization of netpool for HIP not possible. Check return value %d and take appropriate measures.

MSG_HIP_NO_OBJ_INIT

`EventText: No initialization of END_OBJ Structure possible`

Type: **Warning**

Initialization of `END_OBJ` for HIP not possible. Check `END_OBJ` pointer and memory.

MSG_HIP_NO_DEVLOAD

```
EventText: hi_main:Loading device into MUX not possible, unit = %d,
pendLoad = %X,Pinitstring = %X, Loaning = %d,pBSP = %X
```

Type: **Warning**

Loading HIP device in MUX not possible. Check parameters transferred to `muxDevLoad`.

MSG_HIP_NO_DEVSTART

`EventText: I_main: Start HIP device not Possible, return value =  %X`

Type: **Warning**

Starting HIP device in MUX not possible. Check return value %X and take appropriate measures.

MSG_HIP_NO_MEM_TO_SI

`EventText: SI_main: allocating of memory for message to SI not possible`

Type: **Warning**

Allocation of memory for message to system interface not possible. Check why no allocatable memory available at gateway.

MSG_HIP_NO_CLPOOL_ID

`EventText: hi_main: No clusterpool ID available`

Type: **Warning**

No cluster pool ID available for sending a packet to an IP via MUX. Check for problem.

MSG_HIP_NO_CLUSTER

`EventText: I_main:No cluster available to make packet,packet_len = %d`

Type: **Warning**

Cluster of requested length not available. The problem may be that not enough clusters of a certain length are free or that the clusters have not been released.

MSG_HIP_NO_CLBLK

`EventText: No clusterblock for netpool available`

Type: **Warning**

No more cluster blocks. Number of defined cluster blocks too low.

MSG_HIP_NO_PMBLK

`EventText: No memory block for incoming messages from MUX`

Type: **Warning**

MUX calls HIP without a pointer to a memory block. Check the interface IP > MUX -> HIP.

MSG_HIP_PKTLEN_ZERO

`EventText: Packet length from MUX = zero`

Type: **Warning**

Length of packet from MUX is 0. Inform person responsible for IP about this message.

MSG_HIP_ALLOC_MES_SI

`EventText: No allocation for message SI possible`

Type: **Warning**

Could not send message from HIP to system interface. Check available memory.

MSG_HIP_PMBLK_ZERO

`EventText: Length of packet from Mux is zero`

Type: **Warning**

Length of packet from MUX is 0. Inform person responsible for IP/MUX about this message.

B.2.32 SI Events (System Interface Events)

MSG_SI_L2STUB_STREAM_ALREADY_OPEN

`EventText: Stream already open for device %X`

Type: **Warning**

Device has already been opened using the `SI_open` procedure. Check MAL to determine why it calls `SI_open` twice.

MSG_SI_L2STUB_COUDNT_OPEN_STREAM

`EventText: Stream couldn’t be opened for device %X`

Type: **Warning**

Error in Vxworks-Costream for opening a data channel for a device. Check maximum number of devices and interpret the error code.

MSG_SI_L2STUB_ERROR_INIT_DRIVER

`EventText: Critical Error in Initializing L2 driver`

Type: **Critical**

Initialization of L2 not possible. Check error code in Vxworks.

MSG_SI_L2STUB_NO_CLONE

`EventText: Unsupported non-Clone open!`

Type: **Warning**

A non-clone entity not supported has been opened.

MSG_SI_L2STUB_OPEN_OTHER_STREAM_NOT_POSSIBLE

`EventText: Unable to open another L2 stream`

Type: **Warning**

Check the Vxworks error code.

MSG_SI_L2STUB_UNEXPECTED_DB_TYPE

`EventText: Unexpected db_type (0x%x)"`

Type: **Warning**

The message type is not allowed for DLPI.

MSG_SI_L2STUB_NO_ALLOC

`EventText: Unable to allocb(%d)`

Type: **Critical**

Out of memory. The gateway performs an automatic restart. An SNMP trap is generated. Further measures not required.

MSG_SI_L2STUB_PORT_NOT_OPEN

`EventText: Port has not been opened`

Type: **Warning**

Port must be opened before transfer can be performed. Check why port is closed.

MSG_SI_L2STUB_UNKNOWN_SOURCE_PID

`EventText: PSource PID not known (0x%x)`

Type: **Warning**

Message from unknown PID. Check who has sent this message.

MSG_SI_L2STUB_UNEXPECTED_EVENT_CODE

`EventText: Unexpected event code (%d) from SWU`

Type: **Warning**

Event code sent from HiPath 3000 not known. Check DH in HiPath 3000.

B.2.33 MAGIC/Device Manager Events

B.2.33.1 Startup and Internal Messages

MSG_DEVM_NO_PROTOCOL_FOR_DEVICE

```
EventText: Device %u could not be bound to protocol %d. Device has been
taken out of service
```

Type: **Major**

Specified device couldn’t be assigned to a protocol and is therefore "out-of-service". Check and correct content of file devmgr.txt.

MSG_DEVM_NO_PROTOCOL_FOR_DEVICE

`EventText: Device %u could not be bound to protocol %d. Device has been taken out of service`

Type: **Major**

Specified device couldn’t be assigned to a protocol and is therefore "out-of-service". Check and correct content of persistent file devmgr.txt.

MSG_DEVM_BINDING_FAILED

`EventText: Protocol rejected. Device ’%u’ will be taken out of service`

Type: **Major**

Invalid protocol specified in persistent file. Check and correct content of persistent file devmgr.txt.

MSG_DEVMGR_DEVICEID_OUT_OF_RANGE

`EventText: The current DeviceId: %d is out of range`

Type: **Major**

Specified device ID is outside valid range. Check and correct content of persistent file devmgr.txt.

MSG_DEVMGR_NO_DEVICE_TYPE_FOR_DEVICE

`EventText: No Device Type for %s Device available in persistency`

Type: **Major**

Invalid device type in persistent file. Check and correct content of persistent file devmgr.txt.

MSG_DEVMGR_NO_DEVICE_ID_FOR_DEVICE

`EventText: No Device Type for %s Device available in persistency`

Type: **Major**

No entry found in persistent file for specified device type. Check and correct content of persistent file devmgr.txt.

MSG_DEVMGR_CREATE_FAILED

`EventText: %s create failed`

Type: **Major**

Device object entity of specified class could not be created. Not enough memory. Restart system.

MSG_DEVMGR_CAN_NOT_READ_PERSISTENCY

`EventText: Can not read %s persistency file`

Type: **Major**

Specified persistent file cannot be read. Check persistent files. Restart system.

MSG_DEVMGR_SCN_TASK_FAILED

`EventText: SCN Task create failed`

Type: **Major**

Class entity of `SCN_TASK` cannot be created; startup interrupted. Restart system.

MSG_DEVMGR_INTERROR_DEVID

Type for following event texts: **Major**

`EventText: SCN Task create failed`

Could not find a valid device pointer in the global device table.

`EventText: DeviceId (%x): Got NULL pointer instead of Resource!`

A null pointer to a resource occurred.

`EventText: DeviceId (%x): No container object found!`

Could not find a valid object pointer in the global table.

`EventText: DeviceId (%x): No protocol manager found!`

Could not find a valid protocol manager.

`EventText: DeviceId (%x): No protocolId in message!`

Could not read protocol ID from persistent file. Check and correct content of persistent file devmgr.txt.

`EventText: DeviceId (%x): If Table init failed, DVMGR not initialized!`

Error in system startup. Could not create IF tables. Restart system. If problem persists, a new APS will be required.

`EventText: DeviceId (%x): Startup failed, DVMGR not initialized!`

Error in system startup. Could not start device manager. Restart system. If problem persists, a new APS will be required.

`EventText: DeviceId (%x): is not a fax deviceId. Could not set fax status.`

Got a wrong device ID.

`EventText: DeviceId (%x): Got NULL pointer !!!`

Received a null pointer.

`EventText: DeviceId (%x): No free channel found!`

Could not find a free channel.

`EventText: DeviceId (%x): Unknown Device Type!`

Unknown device type received. Check and correct content of persistent file devmgr.txt.

`EventText: DeviceId (%x): Device %d can’t be created!`

Could not create device. No connections possible for this device.

`EventText: DeviceId (%x): Insert in global Device Table failed!`

Inserting in global device table failed. This device will not be known to the system.

Type for following event text: **Minor**

`EventText: DeviceId (%x): Not enough memory to create Resource object!!`

Not enough memory to create a resource.

Type for following event texts: **Warning**

```
EventText: DeviceId (%x): Amount of configured resources exceeds overall
limit.
```

The number of total resources is less than the number of resources assigned to this device. Check configuration of resources in devmgr.txt.

`EventText: DeviceId (%x): Unexpected SUSY id !!!`

Got an unexpected SUSY ID.

`EventText: DeviceId (%x): iAdmCommand: Unexpected value received`

Got an unexpected command.

`EventText: DeviceId (%x): id >= MAX_RESOURCE_NUMBER!`

Got wrong resource.

`EventText: DeviceId (%x): Wrong param from persistency file gwglobal.txt!`

Could not read parameter from persistent file. Check and correct content of persistent file gwglobal.txt.

`EventText: DeviceId (%x): BChannel not found in resources!`

Could not find B channel in resources.

`EventText: DeviceId (%x): Got a LOGON_TRK_IND msg for wrong device!`

Got a message for wrong device.

`EventText: DeviceId (%x): Unknown resource state!`

Resource state unknown.

`EventText: DeviceId (%x): Configured Trunk Channels exceed physical Limit!`

The configured trunk channels (Manager E) exceed the number of physical B channels.

Type for following event texts: **Information**

`EventText: DeviceId (%x): Unknown AdminState! AdminState set to AStateDown`

Unknown admin state.

```
EventText: DeviceId (%x): Shutdown of SCN_Task failed! Continue with
Shutdown.
```

Shutdown of `SCN_TASK` failed. Shutdown will be continued anyway.

MSG_DEVMGR_INTERROR_RESID

Type for following event texts: **Warning**

`EventText: ResourceId (%x): Fax Indication received from wrong device`

Wrong device type.

`EventText: ResourceId (%x): No ASCII character defined for digit %d`

Wrong digit.

```
EventText: ResourceId (%x): G711TransparentChannel Indication not from SCN-
side
```

Wrong indication.

`EventText: ResourceId (%x): State RESOURCE_IN_USE not set!`

Could not change state.

`EventText: ResourceId (%x): State RESOURCE_IDLE not set!`

Could not change state.

`EventText: ResourceId (%x): DecreaseResourceCounter() failed`

Decrease of the resource counter failed.

`EventText: ResourceId (%x): Leg not opened`

Leg is not opened yet.

`EventText: ResourceId (%x): No Codecs available!`

Did not find a codec. Calls not possible.

`EventText: ResourceId (%x): Codec value out of range!`

Unknown codec.

`EventText: ResourceId (%x): Number of licenses out of range!`

Unknown codec quantity.

`EventText: ResourceId (%x): new state not expected!`

Got unexpected state.

`EventText: ResourceId (%x): Leg already in a connection`

The system’s own Leg or the partner Leg is already connected. Reject command.

`EventText: ResourceId (%x): ChangeState(%d): N/A in state %s`

State cannot be changed due to wrong state.

`EventText: ResourceId (%x): Resource not in state RESOURCE_IN_USE`

Wrong state.

`EventText: ResourceId (%x): No Dtmf tone defined for character %c`

Wrong character.

Type for following event texts: **Major**

`EventText: ResourceId (%x): GOT NULL POINTER !!!`

Received a null pointer.

MSG_DEVMGR_INTERROR_CHNID

`EventText: ChannelId (%x): Channel out of range!`

Type: **Warning**

Wrong channel number.

MSG_DEVMGR_MSCERROR_RESID

Type for following event texts: **Warning**

`EventText: Could not connect Legs. TIMEOUT, Faxstatus not changed from MSC`

Legs could not be connected because of timeout.

`EventText: DCould not connect Legs; FAX_STATUS_ERROR from MSC`

Legs could not be connected because of `FAX_STATUS_ERROR` from MSC.

B.2.33.2 LEG Management Messages

MSG_DEVMGR_OPEN_LEG_FAILED

`EventText: Open of %s Leg failed;  MSC Error Code %d`

Type: **Warning**

Payload Leg couldn’t be opened; MSC responds with specified error code.

MSG_DEVMGR_OPEN_WRONG_RES_STATE

`EventText: Open of %s Leg failed; Resource State %d`

Type: **Warning**

Resource state unexpected. State not changed, but returns `false` to the caller.

MSG_DEVMGR_UPDATE_LEG_FAILED

`EventText: Update of %s Leg failed;  MSC Error Code %d`

Type: **Warning**

Data of payload Leg could not be changed; MSC responds with specified error code.

MSG_DEVMGR_CONNECT_WRONG_LEGS

`EventText: Connect of %s Leg failed; Partner not a %s Leg`

Type: **Warning**

Partner Leg has a wrong Leg type, which is why the connection cannot be established.

MSG_DEVMGR_CONNECT_LEGS_FAILED

`EventText: Connect of %s Leg failed; MSC Error Code %d`

Type: **Warning**

Connection to specified Leg failed; MSC created specified error code.

MSG_DEVMGR_LISTEN_WRONG_RES_STATE

`EventText: ListenForConnect on %s Leg failed; State %d Mode %d`

Type: **Warning**

Listening on the fax channel failed due to either false state or false mode.

MSG_DEVMGR_CONNECT_WRONG_RES_STATE

`EventText: Connect on %s Leg failed; State %d Mode %d`

Type: **Warning**

Connection on the fax channel failed due to either false state or false mode.

MSG_DEVMGR_DISCONNECT_LEGS_FAILED

`EventText: Disconnect of %S Leg failed; MSC Error Code %d`

Type: **Warning**

Disconnect of payload Legs failed; MSC responds with specified error code.

MSG_DEVMGR_CLOSE_LEG_FAILED

`EventText: Close of %s Leg failed;  MSC Error Code %d`

Type: **Warning**

Proper closing of payload Leg failed; closed anyway.

B.2.33.3 Layer2 Communication Messages

MSG_SCN_ERROR_12_MSG

`EventText: L2 Error: %d Primitive: %d received on Device: %d`

Type: **Major**

Layer2 has sent an error message; logged only.

MSG_SCN_ADD_PARAMETER_FAILED

`EventText: L2 Error: %d Primitive: %d received on Device: %d`

Type: **Major**

Add parameter failed.

MSG_SCN_DEV_NOT_IN_DEVLIST

`EventText: Device %d not in devicelist of SCN_TASK`

Type: **Major**

Specified device not found in device list.

MSG_SCN_GET_ADMMSG_FAILED

`EventText: Reading message from admin stream failed`

Type: **Major**

A message cannot be read from the admin stream.

MSG_SCN_GET_LDAPMSG_FAILED

`EventText: Reading message for device %d failed`

Type: **Major**

A message cannot be read from the admin stream.

MSG_SCN_UNEXPECTED_L2_MSG

`EventText: Unexpected layer2 message on device %d`

Type: **Major**

Layer2 has sent an unexpected DLPI message; logging only.

MSG_SCN_OPERATION_ON_STREAM_FAILED

`EventText: Operation on stream failed for device %u`

Type: **Major**

Operation on specified stream failed.

MSG_SCN_POLL_FD

`EventText: Poll returned unexpected value -1`

Type: **Major**

Polling failed.

MSG_SCN_OPEN_STREAM_FAILED

`EventText: Open stream failed on device %d`

Type: **Major**

Opening communication path to Layer2 failed. Restart system.

MSG_SCN_UNEXPECTED_POLL_EVENT

`EventText: Unexpected poll event on device %u`

Type: **Major**

Got an unexpected event on the specified device.

MSG_SCN_BIND_FAILED

`EventText: Bind for device: %d failed`

Type: **Major**

Binding layer2 communication path failed. Restart system.

MSG_DEVMGR_LAYER2_SERVICE_TRAP

Type for following event texts: **Critical**

```
EventText: DEVMGR DevId: %d Layer2 Out-Of-Service; Waiting for
DL_CONNECT_IND
```

Message from SI missing; layer2 not ready. An SNMP trap is generated.

`EventText: DEVMGR DevId: %d Layer2 Out-Of-Service; Initiated by Layer2`

SI takes layer2 out of service. No more calls possible for this device. An SNMP trap is generated.

```
EventText: DEVMGR DevId: %d Layer2 Out-Of-Service; Initiated by
Application/Operator
```

Administrator takes Layer2 out of service. No more calls possible for this device. An SNMP trap is generated.

Type for following event text: **Information**

`EventText: DEVMGR DevId: %d Layer2 In-Service`

Layer2 is ready. Connections to this device possible. An SNMP trap is generated.

B.2.34 Important Platform Software Status Events

MSG_ASP_INFO

Type for following event texts: **Information**

```
EventText: Booting DSP module #<nr>  with <DSP SW Version > from < date>
```

This message appears at startup and marks the beginning of the boot procedure of the DSP module.

```
EventText: Loading ...
```

This message is displayed at startup and marks the beginning of the DSP software download.

```
EventText: Booting DSP Modules #<nr> done
```

This message appears at startup and marks the successful conclusion of the boot procedure of the DSP module.

B.2.35 Major ASC Events

MSG_ASC_ERROR

```
EventText: DSP channel not initialized
```

Type: **Indeterminate**

Possibly a configuration problem. Verify the ASC configuration in the gateway.

B.2.36 Major ASP Events

MSG_ASP_ERROR

Type for following event texts: **Critical**

```
EventText: Hardware Configuration invalid: <error string>
```

Different DSP modules (DDM1, DDM2) plugged in. Check the DSP modules on the main board.

```
EventText: DSP Error 7,<nr>,0,0,0,0...
```

An RTP packet of invalid length may have been received from the LAN. Displayed on console only.

`EventText: DSP Error 9,<nr>,0,0,0,0...`

Space problem: something is blocked on the DSP side. Displayed on console only.

B.2.37 Minor ASP Events

MSG_ASP_INFO

`EventText: fec restarts because of high traffic on LAN - Restart counter <nr>`

Type: **Information**

This message appears every tenth time that the FEC sender is blocked by a collision or by high-volume traffic. Some packets are lost when FEC is restarted automatically. Monitor LAN traffic.

B.2.38 IP Filter Events

MSG_IPF_STARTED

`EventText: IP Filter started`

Type: **Information**

An IP filter object has been created.

MSG_IPF_STOPPED

`EventText: IP Filter stopped`

Type: **Information**

An IP filter object has been destroyed.

MSG_IPF_ON_OFF

`EventText: IP Filter is switched %s`

Type: **Information**

IP filter was switched ON/OFF.

MSG_IPF_PARAMETER

`EventText: Rule number %d: missing parameter %s`

Type: **Critical**

When reading the specified filter rule, could not read specified parameter.

B.2.39 MAC Filter Events

MSG_MAF_STARTED

`EventText: MAC Address Filter started`

Type: **Information**

A MAC address filter object has been created.

MSG_MAF_STOPPED

`EventText: MAC Address Filter stopped`

Type: **Information**

A MAC address filter object has been destroyed.

MSG_MAF_ON_OFF

`EventText: MAC Address Filter is switched %s`

Type: **Information**

MAC address filter was switched ON/OFF.

MSG_MAF_PARAMETER

`EventText: Rule number %d: missing parameter %s`

Type: **Critical**

When reading the specified filter rule, could not read specified parameter.

MSG_MAF_NO_OF_RULES

`EventText: Number of rules is bigger than the maximum of %d`

Type: **Critical**

The number of rules entered is greater than the predefined maximum.

MSG_MAF_NETBUFFER

`EventText: IP packet seems to be corrupt`

Type: **Critical**

An error occurred when trying to access the memory area where the IP packet should be.

MSG_MAF_ETHERNET_HEADER

`EventText: Cannot find ethernet header of IP packet`

Type: **Critical**

An error occurred when trying to access the Ethernet header of an IP packet.

B.2.40 IP Stack Events

MSG_IPSTACK_NAT_ERROR

`EventText: CNAT Error: %s`

Type: **Critical**

Critical error occurred during net address translation (NAT).

MSG_IPSTACK_SOH_ERROR

`EventText: Error occurred in Socket Handler`

Type: **Critical**

Error occurred in Socket Handler.

MSG_IPSTACK_INVALID_PARAM

`EventText: IP Stack invalid parameter %s, value %s`

Type: **Minor**

IP Stack receives invalid parameter.

B.2.41 DELIC Events

MSG_DELIC_ERROR

`EventText: delic mailbox fatal error; reboot delic`

Type: **Critical**

Reboot after a critical DELIC mailbox error. Reboot will be executed automatically. HiPath not informed.

B.2.42 Test Loadware Events

MSG_TESTLW_INFO

`EventText: Info: %p`

Type: **Information**

Information about TESTLW functions (successful initialization, etc.).

MSG_TESTLW_ERROR

`EventText: Error: %p`

Type: **Major**

Errors during initialization due to receipt of an unknown message, or with buffer and timer errors.

B.2.43 Fax Converter, HDLC and X.25 Events

MSG_FAXCONV_INFO

`EventText: Info: %p`

Type: **Information**

Information about Fax Converter module (successful initialization, operations, etc.).

MSG_FAXCONV_ERROR

`EventText: Error: %p`

Type for following errors: **Warning**

Errors during initialization, receiving an unknown message, buffer errors.

Type for following errors: **Major**

Errors opening Fax Converter module.

MSG_T90_INFO

`EventText: Info: %p`

Type: **Information**

Information about T.90 protocol module (successful initialization, operations, etc.).

MSG_T90_ERROR

`EventText: Error: %p`

Type: **Warning/Major**

Errors during initialization, receiving an unknown message, buffer errors.

MSG_X25_INFO

`EventText: Info: %p`

Type: **Information**

Information about X.25 protocol module (successful initialization, operations, etc.).

MSG_X25_ERROR

`EventText: Error: %p`

Type: **Warning/Major**

Errors during initialization, receiving an unknown message, buffer errors.

MSG_X75_INFO

`EventText: Info: %p`

Type: **Information**

Information about X.75 protocol module (successful initialization, operations, etc.).

MSG_X75_ERROR

`EventText: Error: %p`

Type: **Warning/Major**

Errors during initialization, receiving an unknown message, buffer errors.

MSG_MSP_HDLC_INFO

`EventText: Info: %p`

Type: **Information**

Information about HDLC driver (successful initialization, operations, etc.).

MSG_MSP_HDLC_ERROR

`EventText: Error: %p`

Type: **Warning/Major**

Errors during initialization, receiving unknown messages, buffer errors and errors when opening HDLC driver.

B.2.44 IP Accounting Events

MSG_IPACCSRV_SOCKET_ERROR

`EventText: Socket Error: %d  (%s)`

Type: **Major**

A fatal error occurred at the socket interface. The gateway performs an automatic restart.

MSG_IPACCSRV_MEMORY_ERROR

`EventText: Memory allocation failed`

Type: **Major**

Application doesn’t get requested memory. The gateway performs an automatic restart.

MSG_IPACCSRV_INTERNAL_ERROR

`EventText: Internal Error in IP Accounting (code: %d %s)`

Type: **Major**

Various errors, for example, when OAM returns an error code. The message is displayed.

MSG_IPACCSRV_MESSAGE_ERROR

`EventText: Wrong internal message (origin: %s, code %d)`

Type: **Warning**

Received unknown message from IP Counting or IP Accounting client. The message is displayed.

MSG_IPACCSRV_MARK_REACHED

`EventText: WIP Accounting data reached upper mark, it shall be read`

Type: **Warning**

Upper level in IP Counting table reached. An SNMP trap is generated. If IP Accounting information is to be processed, log onto the IP Accounting client.

MSG_IPACCSRV_OVERFLOW

`EventText: IP Accounting data has overflown`

Type: **Warning**

Upper level in IP Counting table reached. Data will be lost. An SNMP trap is generated. If IP Accounting information is to be processed, log onto the IP Accounting client.

MSG_IPACCSRV_LOGON

`EventText: Login of IP Accounting client: %s`

Type: **Information**

Depending on the dummy %s, provides information on whether logon was successful or not. The message is displayed. If logon was unsuccessful, check reason.

B.2.45 Endpoint Registration Handler (ERH) Trace Events

MSG_ERH_INFORMATION

`EventText: %p`

Type: **Information**

Important ERH information. Check this event in connection with other ERH events if necessary.

MSG_ERH_ERROR

`EventText: %p`

Type: **Warning**

Errors, which occurred during an ERH operation (if not classified in other event classes). To get more information create a trace with ERH_REGISTRATION, ERH_ADMISSION and ERH_CONFIGURATION and trace level 6.

MSG_ERH_REGISTRATION_ERROR

`EventText: %p`

Type: **Warning**

Errors, which occurred during ERH registration. To get more information create a trace with ERH_REGISTRATION, ERH_CONFIGURATION and trace level 6. Very often this error is caused by a corrupt configuration. In addition, read messages of type MSG_ERH_INFORMATION.

MSG_ERH_ADMISSION_ERROR

`EventText: %p`

Type: **Warning**

Errors, which occurred when endpoints were being set up or cleared down. To get more information create a trace with ERH_ADMISSION and trace level 6. Check the endpoints that are not working.

MSG_ERH_SECURITY_DENIAL

`EventText: %p`

Type: **Critical**

This indicates that the ERH has rejected a request for registration, de-registration, setup or cleardown of endpoints for security reasons. Check carefully whether this message was caused by a faulty configuration in the network, or whether it is the result of attacks from a network hacker.

MSG_ERH_NO_LICENSE

`EventText: %p`

Type: **Warning**

More licenses need to be configured in the license manager (Manager E).

B.2.46 IPNCV Events

MSG_IPNCV_SIGNALING_ERROR

`EventText: IPNCV Signaling Error: %s`

Type: **Warning**

Software error: invalid internal data found.

B.2.47 XMLUTILS Events

MSG_XMLUTILS_ERROR

`EventText: %d`

Type: **Major**

An error has occurred in the XMLUTILS component.

B.2.48 Error Events

MSG_OSF_PCS_ERROR

`EventText: %p`

Type: **Major**

OSF has discovered a major error.

B.2.49 LAN signaling events – CCE

CCE_GENERAL_ERROR

`EventText: ...`

Type: **Major, Minor, Warning, Information**

CCE error not resolved through interaction with PSS saving (e. g. interaction with a QDC client).

CCE_PSS_STORE_ERROR

`EventText: ...`

Type: **Major, Minor, Warning, Information**

CCE error resolved through interaction with PSS saving (e. g. interaction with a QDC client).

B.2.50 Events for LLC operation

MSG_LLC_EVENT_MISSING_RESOURCE

`EventText: %p`

Type: **Information**

Important information about an LLC operation.

MSG_LLC_EVENT_UNEXPECTED_RETURN_VALUE

`EventText: %p`

Type: **Critical**

In the case of errors that arise during an LLC operation (provided they are not already classified in other event classes).

MSG_LLC_EVENT_MISSING_PARAMETER

`EventText: %p`

Type: **Critical**

Mandatory element missing from message.

MSG_LLC_EVENT_INVALID_PARAMETER_VALUE

`EventText: %p`

Type: **Warning**

Invalid message.

B.2.51 Client related events

(Events in the QoS Data Collection category)

QDC_SIGNALLING_DATA_ERROR

```
EventText: Signaling data could not be completely retrieved for the QDC
report
```

Type: **Information**

Signaling data could not be completely retrieved for the QDC report.

QDC_MSG_QUEUE_ERROR

`EventText: QDC message queue is full.`

Type: **Major**

QDC message storage is full. Messages may be lost.

QDC_SYSTEM_ERROR

`EventText: QDC software failure`

Type: **Major**

QDC is not running correctly.

QDC_ ERROR_IN_COMMON_CLIENT

`EventText: Error in QDC Common Client: %s`

Type: **Warning**

General error message; Reason described in specific text represented instead of %s.

B.2.52 QDC CGWA related Events

(Events in the QoS Data Collection category)

QDC_INVALID_CONFIGURATION

`EventText: Invalid QDC configuration`

Type: **Warning**

The administrator is attempting to use an invalid QDC configuration.

QDC_PERSYSTENCY_ERROR

`EventText: QDC default configuration could not be read from the persistency`

Type: **Warning**

The default QDC configuration could not be read from the persistency.

QDC_ERROR_IN_CLIENT

`EventText: Error in QDC Client: %s`

Type: **Warning**

General error message; Cause of error in plain text instead of %s.

B.2.53 QDC VoIPSD error report events

QDC_VOIPSD_ERROR

`EventText: Error in secure data handling: %s`

Type: **Information**

One of the components reports an error with "secure" data transmission: %s

B.2.54 SIP events

SIP_INFORMATION

`EventText: ...`

Type: **Major, Minor, Warning, Information**

Just informationSHT: startup/shutdown.

SIP_INVALID_PARAMETER_VALUE

`EventText: ...`

Type: **Major, Minor, Warning**

There is a parameter that exceeds the specified value range.

SIP_UNEXPECTED_RETURN_VALUE

`EventText: ...`

Type: **Major, Minor, Warning**

The current function returns an unexpected result.

SIP_INVALID_POINTER

`EventText: ...`

Type: **Major, Minor, Warning, Information**

This pointer has got an invalid value.

C WAN/LAN Management

The administration of linked networks in WAN/LAN is a highly technical procedure. When performing this task, configuration problems will always crop up which need to be corrected quickly and efficiently. The information provided in the following sections is intended to help you in such cases.

C.1 Utility Programs for TCP/IP Diagnostics

Any operating system provides tools designed for finding faults in a TCP/IP environment which do not have an obvious explanation. As each operating system includes its own tools and corresponding command parameters, only the main Microsoft operating system functions are described here. Other tools for UNIX-based operating systems are described in detail in RFC 1147. Special parameters are contained in the Help for the corresponding operating system and can normally be queried by entering `<Command> -?`

C.1.1 ping

The tool most often used is probably the `ping` command. This command allows you to check whether a computer in the network can be reached, that is whether communication with that computer is possible. An ICMP ECHO message is sent to the computer and then returned to the sender. If the answer reaches the sending computer, communication with the specified computer is possible. Most variants of the PING command produce connection statistics.

Syntax for Windows operating systems:

```
ping <Host> [<Parameter>]
```

The following entries are possible for `<Parameter>`:

`<Host>` Contains the destination address or the host name of the destination computer

`-t` Uninterrupted transfer of test packets to the computer. Normally only 4 test packets are transferred.

`-a` IP addresses are resolved to host names.

`-n <number>` Sends <Number> test packets to the computer.

`-l <size>` Sends test packets with <Size> bytes

`-I <TTL>` Number of router hops allowed for one packet. The counter is set to a starting value by the sender and decremented by each router that forwards the packet.

`-w <Timeout>` Timeout in milliseconds to wait for each reply. If this time elapses, a timeout message appears. This value is set by default to 1000 (1s). It is advisable to set this value to 5000 (5s) or 10000 (10s) in the case of slow connections such as via modem or GSM. If the reply takes more than 1 second, a timeout message will be received even though a connection is possible.

Example:

Check connection to local computer. The local computer can normally be reached under the loopback address `127.0.0.1` and the name `localhost`.

```
C:\>ping localhost

PING is executed for the local host [127.0.0.1] with 32 bytes of data:

Reply from 127.0.0.1: bytes=32 time<10msec TTL=128

Reply from 127.0.0.1: bytes=32 time<10msec TTL=128

Reply from 127.0.0.1: bytes=32 time<10msec TTL=128

Reply from 127.0.0.1: bytes=32 time<10msec TTL=128
```

Messages:

If the remote computer does not reply, the error can be deduced from the messages.

- Invalid IP address (unknown host):
  The host name could not be converted to a valid IP address. This message is generated when the DNS server cannot be reached or is out of service. This message is only output when the host is addressed using a name.
- Destination host not available (network unreachable):
  There are no valid routes to the destination system. The destination address could not be reached, as a gateway is out of service or was not correctly specified on the local host.
- Timeout:
  The computer has a route to the destination computer but there is no reply. The message reaches the destination host, but cannot be returned. This error is caused by incorrect routing of the destination computer.

C.1.2 ipconfig

The `ipconfig` program is a quick way of querying the TCP/IP network configuration. In this way you can display IP addresses, netmasks, gateways and network card statistics. It also enables IP addresses assigned via DHCP to be released or renewed.

Syntax for Windows operating systems:

```
ipconfig [<Parameter>]
```

The following entries are possible for `<Parameter>`:

`/all` Shows details of the network configuration. This includes the host name, DNS servers used, MAC addresses of each network adapter and DHCP information.

`/release [Adapter]` Releases the IP address assigned via DHCP at the adapter.

`/renew [Adapter]` Assigns a new IP address to the adapter via DHCP.

If no adapter is specified under the parameters `release` and `renew`, all IP addresses at all adapters assigned via DHCP will be released or re-assigned.

Example:

Detailed query of current configuration:

```
C:\>ipconfig /all


Windows NT IP Configuration
   Host Name ..............:    myhost.siemens.de
   DNS Server..............:    192.168.50.23
                                192.168.50.160
   Node Type ..............:    Broadcast
   NetBIOS Scope ID .....:
   IP Routing Enabled.....:     No
   WINS Proxy Enabled.....:     No
   NetBIOS Resolution Uses DNS: Yes
 Ethernet adapter El90x2:
    Description.............:    3Com 3C90x Ethernet adapter
    Physical Address.........:   00-10-5A-DD-56-55
    DHCP Enabled............:    No
    IP Address..............:    192.168.129.1
    Netmask.................:    255.255.255.0
    Default Gateway.........:
```

```
Ethernet adapter El90x1:
   Description.............:    3Com 3C90x Ethernet adapter
   Physical Address.........:   00-10-5A-37-26-B1
   DHCP Enabled............:    Yes
   IP Address...............:   192.168.14.6
   Netmask..................:   255.255.255.0
   Default Gateway..........:   192.168.14.1
   DHCP Server..............:   192.168.11.103
   Lease Supplied....... ...:   Tue, 17.08.1999 08:43:30
   Lease Expires............:   Tue, 19.01.2038 04:14:07
```

C.1.3 nslookup

An IP address can be assigned via a host name. This assignment of name and IP address is stored in the DNS server (DNS = Domain Name Server). The command `nslookup` can be used to query data that was saved for a specific host in the DNS server. By entering the command `nslookup` in the MS-DOS prompt, the program tries to contact the DNS server provided in the network. If a name is queried, the corresponding IP address is returned. Conversely, if an IP address is queried, the host name is returned. If neither the IP address nor the host name is stored in the DNS server, a corresponding error message is output.

The `ping` command message `Invalid IP address` indicates that the host name specified cannot be converted into an IP address. This occurs when the DNS server is out of service or the entry does not exist. This requires that the DNS servers are entered in the network configuration and can be addressed via network.

`nslookup` can be used to query various entries (records) on the DNS server. Once the program has been started, the following entries can be used to query the corresponding data.

```
set Type=<Type>
```

The following entries are possible for `<Type>`:

`a`	Address entries
`any`	All entries
`mx`	Mail Exchanger entries
`ns`	Name Server entries
`soa`	Start of Authority entries
`hinfo`	Host Info entries
`axfr`	All entries in a single area
`txt`	Text entries

Syntax for Windows operating systems:

```
nslookup <Host>
```

`<Host>` Contains the destination address or the host name of the destination computer

Example:

```
C:\>nslookup localhost

Server: ns.domain.com

Address: 192.168.0.1

Name: localhost

Address: 127.0.0.1
```

The host "localhost" has the IP address 127.0.0.1.

C.1.4 Host name

The command `hostname` returns the name of the local computer. Unlike other operating systems, in Microsoft operating systems the host name cannot be changed using this command.

Example:

```
C:\>hostname

localhost
```

C.1.5 netstat

The command `netstat` is used to check existing connections and configured routes, and returns detailed statistics and information on individual network interfaces. Besides the routing table, the most frequently used `netstat` function is the query feature, which ascertains which connections exist at the local computer as well as the status of these connections.

Syntax for Windows operating systems:

```
netstat [<Parameter>] [<Interval>]
```

The following entries are possible for `<Parameter>`:

`-a` Displays all connections, i. e. listening applications such as a Telnet server are also displayed.

`-e` Displays Ethernet statistics

`-n` Displays IP addresses instead of host names

`-p <Proto>` Displays connections established via the `<Proto>` protocol

`-r` Displays the routing table, which can also be displayed using `route print`.

`-s` Displays statistics for each protocol

`<Interval>` Repeats the display after <Interval> seconds

Example:

Queries all connections in IP address format (abbreviated)

```
C:\>netstat -a -n

Active Connections

Proto        Local address       Remote address      Status
....
....
TCP          0.0.0.0:25          0.0.0.0:0           LISTENING
TCP          0.0.0.0:80          0.0.0.0:0           LISTENING
....
....
TCP          192.168.129.3:110   192.168.129.1:1037  ESTABLISHED
TCP          192.168.129.3:23    192.168.129.2:1038  ESTABLISHED
TCP          192.168.129.3:1031  192.168.129.1:80    ESTABLISHED
....
....
UDP          0.0.0.0:25          *:*
UDP          0.0.0.0:80          *:*
....
```

IP connections and their statuses can be displayed using this table. Before explaining this example in more detail, we will briefly discuss the variables.

`<Proto>` Indicates the protocol used for the communication. In this case, Windows only distinguishes between TCP and UDP. Unfortunately, certain servers which only operate via a single protocol are displayed both as TCP and as UDP servers. This prevents accurate determination of the actual protocol in use.

`<Local address>` This indicates the local address which has established a connection or is listening for a connection. The local address and the remote address are displayed in the format
<IP address>:<Port number>.

`<Remote address>` This indicates the remote address which has established a connection or to which a connection has been established.

`<Status>` Shows the current status of the following connections:

`ESTABLISHED` The local computer has set up a connection to a server. In this case the local computer is a client.

`LISTENING` The local computer is ready to accept a connection. In this case the local computer is a server.

`SYN_SENT` The local computer signals to the server that it would like to establish a connection.

`SYN_RECEIVED` The local computer where the server is running has received a "SYN_SENT" signal, that is the client would like a connection to be established.

`FIN_WAIT_1` The local computer would like to clear down the connection to the server.

`TIME_WAIT` The local computer is waiting for server confirmation that the connection is to be terminated.

`CLOSE_WAIT` The local computer where the server is running has received a "FIN_WAIT_1" signal, that is the client would like a connection to be cleared down.

`FIN_WAIT_2` The local computer has received confirmation from the server to clear down the connection.

`LAST_ACK` The server has sent confirmation that the connection is to be cleared down.

`CLOSED` The server has received client confirmation that the connection has been cleared down.

A computer can be both a client and a server at the same time. This is the case, for example, where the local computer is connected to its own server. This is possible using the loopback interface 127.0.0.1. If, for example, a Telnet server is running on the local computer, a Telnet session can be opened on the local computer using the command `telnet localhost`.

In order to determine which data can be collated using the above example, we will now explain the procedure step by step.

```
Proto    Local address      Remote address   Status
TCP       0.0.0.0:80        0.0.0.0:0        LISTENING
TCP       0.0.0.0:25        0.0.0.0:0        LISTENING
```

The first two entries are in the "LISTENING" state, that is two programs (servers) have been started on the local computer, both of which are waiting for a client to establish a connection with them. Both are connected to the IP address "0.0.0.0". This IP address indicates that the server is connected to all available network interfaces. Even if only one network card is installed, this already has two interfaces, that is the local network card (192.168.129.3) and the loopback interface "127.0.0.1" which is installed as standard by Windows. In this example, a HTTP server (Port 80) and an SMTP server (Port 25) are running on the local computer. In order to determine whether the network card is working correctly, send a test ping from the local computer, e.g. `ping 192.168.129.3`. Any error message triggered by this test indicates an incorrectly configured network interface. If you wish to test the connection to the local HTTP server for example , simply use your Web browser and enter the URL `https://127.0.0.1` or `https://192.168.129.3`. Entering "telnet localhost 25" or "telnet 192.168.129.3 25" allows a connection to be established to the local SMTP server. In this case, the port (that is the application) is specified using 25.

The next three entries are all active connections. These can be established either from the local to the remote computer, or from the remote to the local computer.

```
Proto    Local address        Remote address        Status
TCP      192.168.129.3:1037   192.168.129.1:110     ESTABLISHED
TCP      192.168.129.3:1038   192.168.129.2:23      ESTABLISHED
TCP      192.168.129.3:80     192.168.129.1:1039    ESTABLISHED
```

In order to distinguish between an incoming and an outgoing connection, the entries contained in the "LISTENING" state (server) are required. To do this, you need to check whether the port specified for the local computer is running on the local computer itself. The first line shows port "1037". This port is not running as a server (LISTENING) on the local computer (192.168.129.3). Thus this must be a connection from the local computer to a remote computer (192.168.129.1) with the port "110" (POP3). In other words, the local computer is in the process of downloading its e-mails from the POP3 server.

The second entry must also be an outgoing connection, as it is also not in the "LISTENING" state on the local computer. The local computer has therefore set up a connection to the computer "192.168.129.2" and port "23" (Telnet). This means that the local computer has opened a Telnet session on the remote PC.

In the third entry, the local port "80" (HTTP) corresponds to that of a server. Thus the remote computer 192.168.129.1 is in the process of opening Web pages on the local computer.

C.1.6 nbtstat

This utility program allows connections which use the "NetBIOS over TCP/IP protocol" (WINS-Client(TCP/IP)) to be tested. In the "NetBIOS over TCP/IP protocol", the NetBIOS packet is packaged in a TCP/IP packet and then unpacked again on the remote side. This is necessary because NetBIOS cannot be routed like TCP/IP. As Windows drives can only be enabled via NetBIOS, such enablements must be packaged in TCP/IP in order to be transferred to other physical networks. For this purpose, Windows creates a NetBIOS name cache which can also be created manually. IP addresses are resolved in a table as computer names. This file is called `lmhosts` and is located in either the system directory or a system subdirectory, depending on the operating system

Win95/98/ME:	*%systemroot%*
WinNT/2000/XP:	*%systemroot%\system32\drivers\etc*

In these directories, Windows provides various test files which can be used as samples. The structure of each test file is explained. These files have the extension *sam*. In this case, the file is called *lmhosts.sam*. If this *lmhosts* file does not already exist, it can simply be copied to *lmhosts* and edited.

Syntax for Windows operating systems:

```
nbtstat [<Parameter>]
```

The following entries are possible for `<Parameter>`:

`-a <Host Name>`	Returns the name table for the computer specified under <Host Name>
`-A<IP address>`	Returns the name table for the computer specified under <IP Address>
`-c`	The NetBIOS Name Cache is listed with NetBIOS names and corresponding IP addresses
`-n`	Lists all local NetBIOS names used
`-R`	Deletes the NetBIOS Name Cache and reloads the file `LMHOST`.
`-r`	Lists the names which have been resolved for the Windows networks
`-S`	Shows client and server connections as IP addresses.
`-s`	Shows client and server connections and resolves the IP addresses into names.

C.1.7 pathping

This command (available in Windows 2000 and later) traces routes and offers additional information as well as `ping` and `tracert` command features. The `pathping` command sends data packets to each router on the way to a destination over a specific time frame. Specific statistics are then calculated using the data packets returned by each segment. The `pathping` command displays packet loss information for every router and every connection so you can see which router or connection is causing network problems.

Win 2000: *%systemroot%\system32*

Syntax for Windows operating systems:

```
pathping [<Parameter>] destination name
```

The following entries are possible for `<Parameter>`:

`-n` Prevents addresses from being resolved to form host names.

`-h <section>` Specifies the maximum number of segments to be transited when searching for a destination. The default value is 30.

`-c <host list>` Separates concatenated computers through the implementation of intermediate gateways (loose source route) based on the host list.

`-p <time period>` Specifies (in milliseconds) the interval between sequential ping commands. The default value is 250 milliseconds (1/4 seconds).

`-q <number>` Specifies the number of requests for each PC on the path. The default value is 100.

`-w <timeout>` Specifies how long (in milliseconds) the system must wait for individual answers. The default value is 3000 milliseconds (3 seconds).

`-T` Adds a layer-2 priority ID to the ping packets (for example, for 802.1) and sends this ID to all network devices on the route. This is a quick and easy way to establish which network devices are not correctly configured for the layer-2 priority. This parameter must be entered in capital letters.

`-R` Checks whether the individual network devices on the route support the Resource Reservation Setup Protocol (RSVP). This protocol allows the host computer to reserve a certain bandwidth for a data flow. This parameter must be entered in capital letters.

`Destination name` Specifies the destination computer (terminal) which is identified either by an IP address or a host name.

C.1.8 route

In order to interconnect several TCP/IP networks, you will need to configure routing. Without routing, it is impossible to leave the local network. Note when routing that the gateway which connects the local network to other networks must be located in the same TCP/IP network as the local computer.

Syntax for Windows operating systems:

```
route <command> <target> <subnet mask> <gateway> [metric <hops>]
[<parameter>]
```

The following entries are possible for `<command>`:

`print`	Displays the current routing table
`add`	Adds a new route
`delete`	Deletes an existing route
`change`	Modifies an existing route

`<Destination>` Indicates the destination host or destination network reachable via the <Gateway>.

`<Subnet>` Specifies the subnet mask.

`<Gateway>` Indicates the IP address of the gateway via which the IP address specified under <Destination> can be reached.

`<Hops>` Indicates the number of gateways located between the sender and the destination. This parameter is only relevant when several routes exist for one destination. Certain routes can be assigned priority using this parameter. However, since there is usually only one gateway, the value "1" can be set here.

The following entries are possible for `<Parameter>`:

`-f` Deletes all routing entries in the routing table

`-p` Creates a permanent entry. This parameter can only be specified using the command `add`. Normally routes are only set statically with the `route` command. This means that routes set in this way will be deleted by a system reboot. The parameter `-p` sets the entry permanently, so that it will not be deleted by a system reboot.

Example 1:

Adding a permanent default route

```
C:\cmd>route add 0.0.0.0 mask 0.0.0.0 192.168.0.199 -p
```

Example 2:

Querying a routing table

```
C:\>route print

Active Routes:

   Network Address Netmask          Gateway         Interface       Number
                                    Address
   0.0.0.0         0.0.0.0          192.168.128.1   192.168.128.14 1
   10.2.0.0        255.255.0.0      192.168.128.1   192.168.128.14 1
   127.0.0.0       255.0.0.0        127.0.0.1       127.0.0.1      1
   192.168.128.14  255.255.255.255  127.0.0.1       127.0.0.1      1
   192.168.128.255 255.255.255.255  192.168.128.14  192.168.128.14 1
   224.0.0.0       224.0.0.0        192.168.128.14  192.168.128.14 1
   255.255.255.255 255.255.255.255  192.168.128.14  192.168.128.14 1
```

The last two entries are multicast or broadcast entries which will not be described in detail here.

C.1.9 tracert

The command `tracert` (trace route) is used to trace the route from the local computer to the destination host. It indicates all gateways located on the route to the destination host.

Syntax for Windows operating systems:

`tracert <Host> [<Parameter>]`

`<Host>` Contains the destination address or the host name of the destination computer

The following entries are possible for `<Parameter>`:

`-d` IP addresses are not resolved to host names

`-h <number>` Indicates the maximum number of gateways to the destination host

`-j <list>` Suggests a gateway route

`-w <timeout>` Wait <Timeout> milliseconds for each reply

Example:

```
C:\cmd>tracert localhost

Tracing route to localhost [127.0.0.1] over a maximum of 30 hops:

1   <10 msec   <10 msec   <10 msec  localhost [127.0.0.1]

Trace complete.
```

C.1.10 ARP

Before a packet can be sent from one host to another, the hardware address (MAC address) of the destination host’s network card must be determined. For this purpose, each computer which communicates via the TCP/IP protocol has an ARP table. "ARP" (Address Resolution Protocol) is used for resolving the IP address to the hardware address (MAC address). Before a connection is established, the ARP table is searched for the required destination host. If the host is not contained in the table, an ARP request with the IP address of the destination host is sent via the network. When the destination host receives this request, it sends its hardware address to the requesting computer. This in turn enters the hardware address in its local ARP table. The next time this connection is set up, the hardware address of the destination host is known and can be applied as usual. If a hardware address located outside the logical TCP/IP network is requested, the only hardware address necessary is that of the router via which the destination host can be reached.

Syntax for Windows operating systems:

```
arp <Parameter>
```

The following entries are possible for `<Parameter>`:

`-a`	Displays the ARP table
`-d`	Deletes an entry from the ARP table
`-s`	Adds a host entry to the ARP table

Example 1:

Entering a new MAC address into the ARP table

```
C:\>arp -s 192.168.0.199 02-60-8c-f1-3e-6b
```

Example 2:

Querying the ARP table

```
C:\>arp -a

Interface: 192.168.0.1 on Interface 1

   Internet Address       Physical Address       Type
   192.168.0.1            00-00-5a-42-66-60      dynamic
   192.168.0.10           00-60-70-cd-59-22      dynamic
   192.168.0.199          02-60-8c-f1-3e-6b      static
```

C.1.11 telnet

Telnet enables the user to log onto a remote computer. By default, the program uses port 23 for this. If you wish to log onto a computer with another port, you must additionally specify the port number.

Syntax for Windows operating systems:

```
telnet [<Host> [<Port>]]
```

<Host> Contains the destination address or the host name of the destination computer

<Port> Port number which identifies the application on the destination computer

Example:

```
C:\>telnet localhost 110
```

C.1.12 Unwanted Internet Connections (DNS Queries)

Problems involving the HiPath HG 1500 establishing Internet connections for no apparent reason or when existing connections do not automatically switch to "short hold" status are usually caused by DNS queries that are sent to the Internet by the LAN PC. To prevent DNS queries from this PC, an appropriate name resolution entry must be made in the Host/Lmhost file on the PC so that all subsequent DNS queries can be answered locally on the PC. In this way an Internet connection will not be established unless the user specifically initiates it (e. g. by starting the browser). This problem can also be observed with other standard routers (e. g. 3COM). It is a protocol-based procedure which can be canceled by appropriate analysis and configuration of the network/PC.

C.2 IP Addressing: Subnets

To circumvent the scarcity of official IP addresses and to divide an IP network into separate sub-networks, the "sub-netting" procedure can be used.

For the allocation of official IP addresses, for example, sub-netting makes it possible to generate additional independent IP networks by using existing Class A, B and C network addresses.

Various classes and standard network masks have been agreed upon for networks:

Class	**Netmask**
A	255.0.0.0
B	255.255.0.0
C	255.255.255.0

Table D-1 Network Classes and Standard Network Masks

Division into independent subnets also offers the considerable advantage that local network traffic remains in its own subnet. Access to third-party networks is only possible via a router.

The basic functionality of sub-netting is relatively simple and is based on the "netmask". This mask is used for defining bits which represent either the network or the host segment within an IP address. Set bits (1) represent the network segment, while deleted bits (0) represent the host segment.

The best way to analyze a netmask is in binary format. The Class C standard netmask "255.255.255.0" is a good example.

	Network			**Host**
Bytes	1st byte	2nd byte	3rd byte	4th byte
Netmask	255	255	255	0
Binary format	1111 1111	1111 1111	1111 1111	0000 0000

Table D-2 Example of a Class C Standard Network Mask

In netmask "255.255.255.0", the first 3 bytes represent the network segment (all bits 1) and the last byte represents the host segment (all bits 0).

The host (router, workstation, etc.) uses this netmask to determine whether the IP address being addressed is located in the local network. If the destination host is not located in the same network, packets are forwarded to this address via suitably defined routing mechanisms.

To create customized subnets, you will first need to determine the number of sub-networks to be established within a class-based network (Class A, B, C). When a network is divided, 2^n subnets are always created as a result. An example will illustrate this more clearly.

The Class C network "192.168.1.0" is to be divided into 4 subnets. A Class C network has the default netmask "255.255.255.0". Two bits are required for four different combinations in the binary system. The following table illustrates the interdependency between the bit number and the number of networks.

Bits	Combinations	Bits	Combinations
1	2^1 = 2	17	2^{17} = 131072
2	2^2 = 4	18	2^{18} = 262144
3	2^3 = 8	19	2^{19} = 524288
4	2^4 = 16	20	2^{20} = 1048576
5	2^5 = 32	21	2^{21} = 2097152
6	2^6 = 64	22	2^{22} = 4194304
7	2^7 = 128	23	2^{23} = 8388608
8	2^8 = 256	24	2^{24} = 16777216
9	2^9 = 512	25	2^{25} = 33554432
10	2^{10} = 1024	26	2^{26} = 67108864
11	2^{11} = 2048	27	2^{27} = 134217728
12	2^{12} = 4096	28	2^{28} = 268435456
13	2^{13} = 8192	29	2^{29} = 536870912
14	2^{14} = 16384	30	2^{28} = 1073741824
15	2^{15} = 32768	31	2^{31} = 2147483648
16	2^{16} = 65536	32	2^{32} = 4294967296

Table D-3 Bit Number Depending on Number of Networks

So that no gaps are left in the address range, additional 1s are added from left to right to the existing 1s of the netmask.

Class C	**Network**			**Host**	
Bytes	1st byte	2nd byte	3rd byte	4th byte	
Netmask	255	255	255	0	
Binary format	1111 1111	1111 1111	1111 1111	0000 0000	
New	**Network**			**Host**	
Bytes	1st byte	2nd byte	3rd byte	4th byte	
Binary format	1111 1111	1111 1111	1111 1111	**11**	00 0000
Netmask	255	255	255	192	

Table D-4 Example of a Subnet Mask Binary Format

If the new subnet is converted from binary to decimal form, the result is the subnet mask "255.255.255.192". Now 26 bits are available for the network segment and 6 for the host segment. Computers with a network segment with the same bit pattern can communicate directly in a physical network. Other networks can only be reached via a gateway. If the modified 4th byte is viewed in terms of the two new network bits (25 and 26), the newly created subnets can now be calculated.

4th byte	Decimal	New networks	Broadcast address	Host addresses
0000 0000	0	192.168.1.0	192.168.1.63	1–62
0100 0000	64	192.168.1.64	192.168.1.127	65–126
1000 0000	128	192.168.1.128	192.168.1.191	129–190
1100 0000	192	192.168.1.192	192.168.1.255	193–254

Table D-5 Calculating New Subnets

Thus sub-netting essentially involves the extension of the network segment of an IP address by reducing the host segment. The number of available subnets and hosts depends on the following conditions:

The number of available host addresses depends largely on the length of the host segment of the IP address. Viewed mathematically, a 6-bit host segment provides for 64 addresses. However, as each IP network and thus each individual subnet has two reserved addresses, the maximum number of addresses is reduced by two. These are the host addresses which contain either zeros or ones. The former is used for addressing a network, while the latter is used for broadcasts in the network in question.

As mentioned above, the new network segment bits are added from left to right to the existing bits. The reasons for this are described below. For example, if you use subnet mask "255.255.255.3" for the network "192.168.1.0", the host segment is located in the middle of the network segment.

	Network			**Host**	**Network**
Bytes	1st byte	2nd byte	3rd byte	4th byte	
Netmask	255	255	255	3	
Binary format	1111 1111	1111 1111	1111 1111	0000 00	**11**

Table D-6 Host Segment in a Network Segment

No associated IP address areas are provided for by this subnet as only the hosts which have set the last two bits are located in a network. The resulting addresses are listed in the following table.

4th byte	Decimal	New networks	Broadcast address	Host addresses
0000 00**00**	0	192.168.1.0	192.168.1.252	4,8,12,16,20,...,248
0000 00**01**	1	192.168.1.1	192.168.1.253	5,9,13,17,21,...,249
0000 00**10**	2	192.168.1.2	192.168.1.254	6,10,14,18,22,...,250
0000 00**11**	3	192.168.1.3	192.168.1.255	7,11,12,19,23,...,251

Table D-7 Network Addresses Depending on Last Two Bit Digits

The host addresses indicate that the individual hosts are not located in associated areas. This type of sub-netting makes it difficult to maintain an overview for administration. This is why this type of sub-netting should not be used.

Up to now we have described how sub-networks are created. We will now explain how the IP addresses of computers are assigned to the respective subnets.

The following table shows four IP addresses for a network (Class C) and their connection to the netmask being used 255.255.255.224.

	Network	Host
255.255.255.224	11111111.11111111.11111111.111	00000
193.98.44.33	11000001.01100010.00101100.001	00001
193.98.44.101	11000001.01100010.00101100.011	00101
193.98.44.129	11000001.01100010.00101100.100	00001
193.98.44.61	11000001.01100010.00101100.001	11101

Table D-8 Allocating IP Addresses to Class C Networks

The binary illustration of masks and addresses shows quite clearly which subnet the IP addresses in question belong to. Addresses 1 and 4 are in subnet ".32" (00100000), address 2 belongs to subnet ".96" (01100000) and address 3 is located in subnet ".128" (10000000).

If the example is based on the standard mask "255.255.255.0" of a Class C network, the length of the network segment is 24 bits, while the host segment is 8 bits long. Based on netmask "255.255.255.224" the network segment of an IP address in the network is exactly 27 bits long. Accordingly the host segment is just 5 bits long.

The following overview provides the most commonly-used Class C masks as a reference, together with the corresponding network and host allocations.

Netmask	Number of networks	Hosts per subnet	Subnet	Broadcast Address	Hosts
255.255.255.0	1	253	0	255	1 – 254
255.255.255.128	2	126	0	127	1 – 126
			128	255	129 – 254
255.255.255.192	4	62	0	63	1 – 62
			64	127	65 – 126
			128	191	129 – 190
			192	255	193 – 254
255.255.255.224	8	30	0	31	1 – 30
			32	63	33 – 62
			64	95	65 – 94
			96	127	97 – 126
			128	159	129 – 158
			160	191	161 – 190
			192	223	193 – 222
			224	255	225 – 254
255.255.255.240	16	16	0	15	1 – 14
			16	31	17 – 30
			32	47	33 – 46
			48	63	47 – 62
			64	79	65 – 78
			80	95	81 – 94
			96	111	97 – 110
			112	127	113 – 126
			128	143	129 – 142
			144	159	145 – 158
			160	175	161 – 174
			176	191	177 – 190
			192	207	193 – 206
			208	223	209 – 222
			224	239	225 – 238
			240	255	241 – 254

Table D-9 Overview of the Most Commonly-Used Class C Masks

Example:

A LAN with two Ethernet networks is to be connected to the Internet via ISDN access. All stations in the local Ethernet are to have Internet access and also be directly accessible from the Internet. Based on the corresponding structures of a Class C address, a complete Class C network would normally have to be provided for each of the two Ethernet networks and for the ISDN network. However, as the maximum number of stations in a Thin Ethernet segment is limited to thirty, 223 host addresses per network would be lost here alone.

This is where sub-netting is of particular significance: With a corresponding netmask, just one Class C network is required to achieve a complete LAN connection, without the loss of host addresses.

For this purpose, an Internet Service Provider provides a Class C network with the following basic data:

Provider IP address:	192.93.98.222
Gateway IP address:	192.93.98.222
Networks IP address:	192.93.98.0
Netmask:	255.255.255.0

The following diagram shows the corresponding configuration:

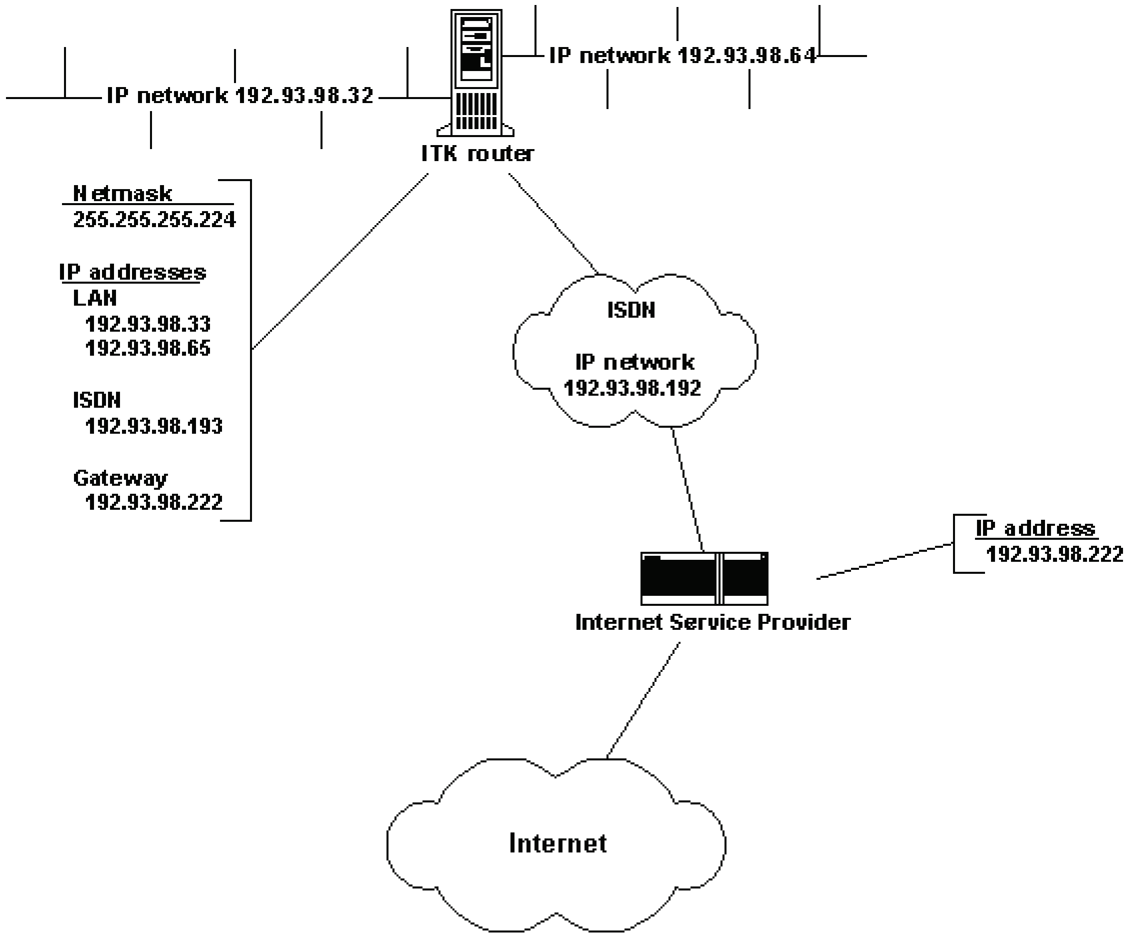

Figure D-10 Connection of BNC Network at Twisted Pair to HG 1500

"255.255.255.224" is available as a netmask, as this mask provides 8 subnets with 30 hosts each. The number of hosts in each subnet is thus equivalent to the maximum number of stations in an Ethernet segment.

This illustration shows that two subnets, in this case "192.93.98.32" and "192.93.98.64", have been assigned to the two LAN boards of the ITK router. One of the LAN boards is assigned the IP address "192.93.98.33" and the other is assigned "192.93.98.65". In this way each board can supply 29 additional stations with IP addresses.

The ISDN (WANODI or Virtual Ethernet) is assigned the IP address "192.93.98.193" from subnet "192.93.98.192". The default gateway in this case is the IP address of the provider access. This ensures that all outgoing packets to networks which are not in the local LAN subnet will be forwarded to the provider.

D The CLI Command Interface

We recommend administrating the gateway via WBM (Web-Based Management). However, this does require that the gateway already has an IP address.

You can use the command line to enter various commands at a terminal connected directly to the gateway without the need for an IP address. Commands can be used for the initial startup and basic configuration and for monitoring certain counters and statistics.

There are two access options for using CLI commands:

- a terminal connected directly to the V.24 interface or a suitable terminal emulation program (for example, HyperTerminal, Linux computer with Minicom application)
- Telnet applications (only in insecure mode).

> ⓘ Access via a Telnet connection is not possible when SSL is enabled. Therefore, data cannot be modified via a Telnet connection in secure mode. The CLI commands are then only available via the V.24 interface.

Before using a Telnet connection, Telnet clients must be configured. Telnet is always enabled by default.

D.1 List of All CLI Commands

The following table contains all the CLI commands. In addition to a brief description, the table also indicates whether a write privilege is required for using the command. The following sections contain descriptions of the individual CLI commands classified according to area of activity.

Command	Description	write access
`activate configuration`	Activates a newly loaded configuration file.	no
`activate software`	Loads the contents of a self-extracting file.	yes
`activate alternate tftp`	Switches from the primary to the alternative TFTP server.	Yes
`activate tftp`	Switches from the alternative to the primary TFTP server.	Yes
`add telnet client`	Adds a Telnet client.	Yes
`add wbm client`	Adds a WBM client.	Yes
`create ssl certificate`	Creates a certificate.	Yes

Table A-10 Overview of CLI Commands

Command	Description	write access
`delete telnet client`	Deletes a Telnet client.	Yes
`delete wbm client`	Deletes a WBM client.	Yes
`disable firewall`	Disables the firewall function.	Yes
`disable ipsec`	Disables the IPsec function.	Yes
`disable ssl`	Disables the SSL function.	Yes
`download configuration`	Copies a configuration file from the TFTP server to the flash file system.	Yes
`download software`	Loads a software image from the TFTP server.	Yes
`enable ipsec`	Enables the IPsec function.	Yes
`enable ssl`	Enables the SSL function.	Yes
`get tftp`	Transfers files from the TFTP server to the gateway.	Yes
`get write access`	Reserves write access.	No
`help`	Displays the list of all available commands.	No
`logout`	Terminates a session.	No
`ping`	Dispatches a data packet.	No
`put tftp`	Transfers files from the gateway to the TFTP server.	Yes
`release write access`	Releases write access.	Yes
`reset`	Restarts the gateway with the current configuration.	No
`reset factory`	Resets the configuration data to the factory default and starts the gateway.	Yes
`reset insecure`	Deletes the security data and switches to insecure IP communication.	Yes
`reset secure`	Resets the configuration data to the factory default and performs a restart to secure mode.	Yes
`save configuration`	Saves a configuration after the restart.	Yes
`set alternate tftp`	Selects the alternative TFTP server.	Yes
`set default gateway`	Assigns the default router.	Yes
`set hostname`	Defines the gateway name.	Yes

Table A-10 Overview of CLI Commands

Command	Description	write access
`set ip address`	Assigns an IP address.	Yes
`set ip subnet`	Assigns a subnet mask.	Yes
`set tftp`	Selects the primary TFTP server.	Yes
`show arp cache`	Displays the current contents of the ARP cache.	No
`show boot`	Displays the start configuration.	No
`show default gateway`	Displays the IP address of the default router.	No
`show fingerprint`	Displays the fingerprint.	No
`show flash`	Displays the utilization ratio of the flash memory.	No
`show hostname`	Displays the gateway name.	No
`show if counters`	Displays the interface counter.	No
`show if states`	Displays the interface status.	No
`show ip address`	Displays the IP address.	No
`show ip subnet`	Displays the subnet mask.	No
`show memory`	Displays the utilization ratio of the RAM.	No
`show mode`	Displays the current operating mode.	No
`show routes`	Displays the entries for static routes.	No
`show telnet clients`	Displays the available Telnet clients.	No
`show tftp`	Displays which TFTP server is active.	No
`show time`	Displays the gateway time.	No
`show uptime`	Displays how long the gateway is enabled.	No
`show versions`	Displays the software versions available.	No
`show wbm clients`	Displays the existing WBM clients.	No
`upload configuration`	Copies the current configuration file to the TFTP server.	Yes
`upload evtlog`	Loads the event log file to the TFTP server.	Yes
`upload trclog`	Loads the trace log file to the TFTP server.	Yes
`who has write access`	Displays who has write access.	No

Table A-10 Overview of CLI Commands

D.2 General commands

This includes commands for logging off, editing command lines, listing available commands, displaying previously defined commands, and for enabling and disabling the Telnet function.

D.2.1 Shell Commands

Every command entered at the command line is written to a command log. The following commands are available for scrolling through and reusing this log:

Help

To display a list of all the commands available, enter:

```
help
```

Last command

You can display the last command executed by pressing the

```
<Up Arrow>
```

You can scroll through the command log by pressing this key and entering the following command.

Next command

The next command in the protocol can be displayed with the following key:

```
<Down Arrow>
```

Editing a command

You can edit a command with the

```
<Backspace key>
```

This deletes the character at the left of the insertion mark.

Logging off

You must log in to start a session. No special command is required for this; authentication is automatically performed by entering a name and password.

To terminate a session, enter:

```
logout
```

D.2.2 Interrupting the Boot Procedure

You can interrupt the start sequence within three seconds after activation by pressing any key on the terminal. The session starts once the start password and root access rights are entered (’Root Administrator’).

After authentication, the boot command line is available. This has other commands than the conventional command line (for detail, see Section D.7, "Start command line").

D.3 Authentication

This includes commands for the write privilege and for configuring Telnet clients and WBM clients.

Write access

You must reserve write access for yourself before saving data, loading it onto the server or downloading it from the server. To do this, you must check that no one else has already reserved write access, then reserve it and release it after the task is completed.

```
who has write access

get write access

release write access
```

Configuring Telnet clients

The following commands are available for configuring access via Telnet and for using a restricted CLI command set:

```
add telnet client <IP address>

delete telnet client <IP address>

show telnet clients
```

Configuring WBM clients

The following CLI commands are available for adding or deleting WBM clients or displaying existing WBM clients:

```
add wbm client <IP address>

delete wbm client <IP address>

show wbm clients
```

Operating mode

The following command can be used to determine the board’s current operating mode:

```
show mode
```

D.4 Configuration

This includes commands for configuring the gateway, transferring files, and restarting.

D.4.1 Installation Commands

To perform the initial configuration you must connect a terminal to the V.24 interface of the gateway. You can enter the IP address and load the software image from a TFTP server via this terminal.

Assigning an IP address to the gateway

You must assign a name, an IP address and a subnet mask for the Ethernet interface to the gateway.

Once it has been entered, the gateway name will be the first element in every command prompt. Any changes to the IP address or subnet mask will only become effective after the gateway is restarted.

To change this information, enter:

```
set hostname <host name>

set ip address <IP address>

set ip subnet <IP subnet mask>
```

Assigning a default router

You must assign a default router to the gateway.

To assign a default router, enter:

```
set default gateway <IP address>
```

D.4.2 Configuration Commands

The gateway has a TFTP client for file transfer purposes. A corresponding TFTP server must be available in the network. The software image and configuration data are downloaded directly to the flash memory. Configuration data, trace files and event logs can be loaded from the gateway onto the server.

Specifying the primary TFTP server

Before you can load files to the gateway or on the server via TFTP, you must select a TFTP server using the following command:

```
set tftp <IP address[:port]>
```

Specifying the alternative TFTP server

In addition to the primary TFTP server, you can specify an alternative TFTP server with the following command:

```
set alternate tftp <IP address[:port]>
```

Switching from the alternative to the primary TFTP server

If the alternative TFTP server has been active and you want to switch back to the primary TFTP server, use the following command to change TFTP servers:

```
activate tftp
```

Switching from the primary to the alternative TFTP server

If the primary TFTP server has been active and you want to switch back to the alternative TFTP server, use the following command to change TFTP servers:

```
activate alternate tftp
```

Downloading software images

You can download a software image from a TFTP server to the gateway by entering:

```
download software <remote filename>
```

Enter the following command to conclude the software image switchover:

```
activate software
```

During this restart you will be asked if the gateway should be completely reinstalled (deleting the flash memory and reinitializing it) or if an update should be performed (replacing the existing files without modifying the configuration).

> This choice is only available if the software was downloaded from a V.24 terminal.

A complete reinstallation results in an empty database with only one software image in the gateway. All previous configuration data is lost.

If an update is performed, the currently active software image is replaced by the new image which is then used at the next reboot.

Loading a configuration onto the server

The following command copies the current configuration file to the TFTP server.

```
upload configuration <remote filename>
```

Downloading, activating and saving a configuration from the server

This command copies a configuration file from the TFTP server to the gateway's flash memory:

```
download configuration <remote filename>
```

Execute the following command to activate the new configuration file:

```
activate configuration
```

The downloaded configuration file replaces the configuration file in the flash memory. Once the command `activate configuration` has been executed, the new configuration is active.

Execute the following command to save the new configuration:

```
save configuration
```

This command transfers the new configuration from the RAM to the flash file system, after which the system is restarted.

TFTP

In addition to the special commands described above, you can also access the TFTP server directly. This is particularly useful for reading trace and event logs. Binary data transfers are supported.

> For security reasons, HiPath HG 1500 can only operate as a TFTP client. The TFTP server must be set up on the partner device.

The `put tftp` command transfers files from the gateway to the server; `get TFTP` transfers files from the server to the gateway:

```
get tftp <remote filename> [<local filename>]
```

```
put tftp <remote filename> [<local filename>]
```

To load trace or event logs on the server, enter:

```
upload trclog <remote filename>
```

```
upload evtlog <remote filename>
```

The protocols are also available on the server, for example, as:

```
/trace/trace.txt
```

```
/trace/trace.bak
```

```
/evtlog/evtlog.txt
```

```
/evtlog/evtlog.bak
```

D.5 Maintenance

This includes commands for diagnostics and for controlling the gateway and interfaces. The maintenance commands enable you to determine the current administrative status of the gateway, to use tools for diagnosing and controlling the gateway and to reboot the gateway.

D.5.1 Inspection

Gateway configuration

These commands display information on the various aspects of the gateway configuration and the gateway time:

```
show versions
```

```
show uptime
```

```
show time
```

Gateway start configuration

This command displays information on the current start configuration of the gateway:

```
show boot
```

Gateway status

The following commands display information on the use of the RAM and flash memory:

```
show memory
```

```
show flash
```

Viewing ARP cache

To view the current contents of the APR cache, enter:

```
show arp cache
```

Interface statuses

The following commands display information on status of the interfaces:

```
show if counters
```

```
show if states
```

Displaying the IP address, name or subnet mask of the gateway

To view the gateway name, IP address or subnet mask, enter:

```
show hostname
```

```
show ip address
```

```
show ip subnet
```

Information on the active TFTP server addresses

To display the IP addresses of the primary and alternative TFTP server and to check which server is currently active, enter:

```
show tftp
```

Default router information

A default router must be assigned to the gateway.

To view the IP address of the current default router:

```
show default gateway
```

Viewing static route entries

To view the entries for static routes, enter:

```
show route
```

Showing the operating mode

To display the board’s current operating mode, enter:

```
show mode
```

ping

This command sends an ICMP ECHO_REQUEST packet to another device in the network.

```
ping <IP address>
```

D.5.2 Resetting the Gateway

Normal reset

To restart the gateway with the current configuration data, enter:

```
reset
```

Resetting using the preset configuration

To restart the gateway with the factory default configuration, enter:

```
reset factory
```

Resetting using a new configuration

To start the gateway in secure mode using the factory default configuration:

```
reset secure
```

The login mask will prompt you to change the preset password. This prompt will be repeated at each subsequent login until you use a different password than the factory default.

Resetting to insecure mode

To delete security data (such as keys or certificates) and to reactivate insecure IP communication, enter:

```
reset insecure
```

> ⓘ Only security-relevant configuration data is deleted.

D.6 Security commands

This includes commands for the initial configuration of SSL functions and for enabling and disabling the IPsec function.

D.6.1 SSL Functions

The initial configuration is performed on site via the V.24 interface.

Enabling and disabling SSL

The following two commands are used for enabling and disabling the SSL function:

```
enable ssl
```

```
disable ssl
```

> Telnet and TFTP are disabled when the SSL function is enabled. The respective Telnet and TFTP functions are only available again when SSL is disabled.

Configuring SSL

A self-signed server certificate (for each gateway) is generated with the following command:

```
create ssl certificate
<cert.name><ser.num><subj.name><val.from><val.till>[<sig.alg>
[<pub.key alg>[<pub.key len>[<alt.name>[<CRL distr. point>]]]]]
```

This means:

`<cert.name>` certificate name
`<ser.num>` serial number of the certificate
`<subj.name>`subject name in the format "`C=<country>, O=<organization>, OU=<use>, CN=<name>"`“, where `<country>`should be specified with two letters, for example, EN.
`<val.from>` beginning of the certificate validity period in the format `YYYY/MM/DD/HH:MM:SS`
`<val.till>` end of the certificate validity period in the format `YYYY/MM/DD/HH:MM:SS`

All time entries refer to GMT.

Optional parameters:
`<sig.alg>` signature algorithm type in the format `DSA_WITH_SHA1` or `MD5_WITH_RSA` or `SHA1_WITH_RSA`
`<pub.key alg>` official key algorithm type in the format `DSA` or `RSA`
`<pub.key len>` length of the official key in the format `768`, `1024`, `1536` or `2048`
`<alt.name>` alternative subject name in the format "`C=<country>, O=<organization>,`

`OU=<use>, CN=<name>“`, where `<country>` is specified with two characters, for example, `EN` or `num.num.num.num` for an IP address
`<CRL distr. point>` CRL distribution point, URL specification.

Example

```
create ssl certificate hxg3 1 “C=DE,O=Siemens,OU=Test,CN=Pattern“
2003/01/01/00:00:00 2003/02/01/00:00:00
```

ⓘ If you wish to use a blank space in a parameter, then you must place this parameter in inverted commas. Example: “`hxg 3`“.

The fingerprint of the generated certificate is displayed.

This fingerprint is important for checking the generated certificate at a later time. Only an unmodified certificate shows exactly the same fingerprint.

To view the certificate fingerprint at a later time, enter:

```
show fingerprint
```

ⓘ A safety message appears when WBM is started after creating a new server certificate via CLI. View the certificate data and compare the fingerprint of the used certificate with the fingerprint of the certificate you generated. Only if the two fingerprints are identical is the certificate unmodified and you can accept it (for details, see Section 7.2.6.1, "Initial Configuration and Activation of SSL").

D.6.2 Enabling and Disabling IPsec

If you have acquired a license for the IPsec function and the SSL function is activated, you can enable or disable the IPsec function with the following commands:

```
enable ipsec
```

```
disable ipsec
```

The following command is available for disabling the integrated firewall:

```
disable firewall
```

D.7 Start command line

The start command line has a separate command set with which you can control and influence the startup of the gateway.

D.7.1 Rebooting

HG 1500 can be restarted via the standard `Reset` command line or via the WBM Reset button. The boot procedure can be interrupted by pressing any key on the keyboard of a terminal connected to the V.24 interface.

D.7.1.1 Initiating Reboot

To reboot an already operating HG 1500:

- **Key combination**

  Press `<CTRL>+<x>` at the same time.

- **WBM input**

  Click the Reset icon.

- **Command line**

  Enter the `Reset` command on a terminal connected to the V.24 interface or alternatively on a Telnet terminal.

In all of these cases, the gateway will restart with the current configuration.

D.7.1.2 Boot sequence

The firmware performs the following tasks during booting:

1. It initializes the hardware components of the board.
2. It tests the hardware components (module test). The Boot ROM displays the results of the integrated self-test as well as information on the boards and the current start parameter ("Boot Line"). A three-second countdown is subsequently performed and displayed on the screen. The boot procedure can be interrupted during the countdown by pressing any key on the terminal connected to the V.24 interface.
3. Once the count down has ended, the system loads the software image from the flash memory into RAM and starts it.
4. Starting the software image activates all hardware components, initializes the kernel, configures the TCP/IP stack (using the IP address given in the start parameters) and links the driver to the kernel.
5. The Boot ROM starts a checking process to monitor the gateway. If this process determines that the gateway is hanging, it will reboot automatically with the current configuration.

LED Indicators During Booting

LED status	Meaning
LED "Fail" flashes red	Flashing LED indicates that software is being reloaded.
LED "Fail" is off, LED "Run" is lit	The boot procedure is finished and the board is operational.

Table B-1 LED Indicators During Booting

D.7.1.3 Interrupting the Boot Procedure

The message `Press any key to stop auto-boot` appears on the terminal during the boot procedure. The boot procedure can be interrupted within three seconds by pressing any key on a keyboard connected to the V.24 interface. The session then starts as for the root administrator and requests a password.

You can manually control the boot procedure by specifying boot commands and changing the start parameters. The "Fail" LED flashes for as long as the boot procedure is interrupted.

D.7.2 Controlling the Boot Procedure

D.7.2.1 Boot Commands

The following commands are available for controlling the boot procedure:

Command	Description
`a`	Enables the TFFS boot line.
`b`	Sets the boot password.
`c`	Changes the start parameters (see also Table 4).
`h`	Shows help on the commands.
`l`	Small "L" prints the Boot logo.
`n`	Displays the network interfaces.
`p`	Displays the start parameters.
`t`	Enables/disables the VLAN tag.
`w`	Loads a software image and copies it to TFFS (per TFTP).

Table B-2 Boot Commands

Command	Description
y	Formats TFFS. You are requested to specify if "Low level" formatting should be performed (recommended if there are serious problems. "Low level" formatting takes longer than standard formatting).
z	Writes the start parameters to TFFS.
C	Modifies the directory.
D	Deletes a file from the TFFS.
L	Lists the contents of the current TFFS directory.
N	Creates a new TFFS directory.
0	Specifies the device addresses of the network interfaces.
P	Displays the path for the current directory.
R	Deletes a directory.
T	Creates a file with any desired name (0 bytes in length) in the TFFS, enabling specific "switch" files to be created for more thorough error detection by the developer.
W	Loads a file and copies it to TFFS (per TFTP).
X	Proceeds with auto-boot operation (`<CTRL>` + `x` initiates a warm start).
#	These commands can be used to correct a faulty RAM disk during a restart. The gateway behaves in the same way as when disconnecting and reconnecting (for debugging only).
*	
?	Shows help on the commands.
@	Starts the system (loads and executes software).

Table B-2 Boot Commands

Boot commands can only be specified via a terminal that is connected to the V.24 interface. They are not available in Telnet sessions.

D.7.2.2 Start Parameters

The following parameters can be modified using the `c` boot command:

Parameters	Description	Sample value
`boot device`	Start unit; available units: `emac0` or `tffs/`	`emac0`
`processor number`	Always zero.	`0`
`host name`	Name of the host from which the system is being started.	`host1`
`file name`	Complete path of the module to be started.	`X_CG25_C.001`
`inet on ethernet (e)`	IP address of HiPath HG 1500 including the subnet mask as a hexadecimal number	`139.1.24.88:ffffff00`
`inet on backplane (b)`	Not used, stays empty.	
`host inet (h)`	IP address of the BootP server from which the system should be started.	`139.1.1.30`
`gateway inet (g)`	IP address of a gateway node if the BootP server is not in the same network as the target device.	`139.1.21.13`
`user (u)`	Access name of the administrator for FTP.	
`ftp password (pw)`	Password for the FTP administrator name.	
`flags (f)`	Configuration options that are specified as numerical values: `0x00` – Load the start configuration via FTP (default) `0x02` – Load icon for local system `0x04` – Deactivate automatic startup `0x08` – Quick automatic start (no countdown) `0x20` – Deactivate logon protection `0x80` – Load start configuration via TFTP	`0x00`
`startup script (s)`	Startup script.	
`target name (tn)`	Name of the target system that is to be added to the host table (necessary).	
other (o)	Must always be set to "emac".	

Table B-3 Start Parameters

D.7.2.3 Editing Start Parameters

If `c` is specified in the command line, the first current start parameter is displayed (for example: `boot device emac0`). To modify this value, specify the new value after the value displayed and press the return key to save the updated value.

The following commands are available for navigating within the command line and for editing entries.

Command	Description
`.`	Entering a point deletes the content of the line.
`<ENTER key>`	Pressing the Enter key displays the next parameter line.
`-`	Entering a minus sign displays the contents of the previous parameter line.
`<CTRL>+<d>`	Inputting `<CTRL>+<d>` terminates the editing process for start parameters.

Table B-4 Commands for Editing Start Parameters

After entering all parameters, press `z` to save the updated values.

> If the start parameters were modified with the `c` command but not saved, only the RAM data is changed. The modified data is only used for the next boot procedure. The changes are only saved to the flash memory after successful startup using the modified parameters.

D.7.3 Software Installation using the Boot CLI

Proceed as follows to correctly install the software using the Boot CLI:

D.7.3.1 Preparations

- The TFTP server is available. A self-extracting file (**.inst*) containing the software image is available on the server in a known directory. This file automatically installs the software during system startup.
- A console is connected to the V.24 interface.

D.7.3.2 Loading the Software to the Flash Memory

1. Press any key on the connected console keyboard if the message "`Press any key to stop auto-boot...`" is displayed on the terminal. The session then starts as for the root administrator and requests a password (but only if this has previously been configured).
2. Enter a valid password.
3. Press `c` and change the start parameters to the following values:

Parameters	Value
`boot device`	`emac0`
`processor number`	`0`
`host name`	Name of the TFTP or FTP server.
`file name`	File name of the software image (e.g. `X_CG25_C.001`).
`inet on ethernet (e)`	IP address of the HiPath HG 1500 including the subnet mask as a hexadecimal number
`inet on backplane (b)`	No changes required.
`host inet (h)`	IP address of the TFTP or FTP server.
`gateway inet (g)`	Gateway IP address, via which the TFTP or FTP server can be reached (optional).
`user (u)`	FTP access name.
`ftp password (pw)`	FTP password.
`flags (f)`	In the case of FTP: `0x00`, in the case of TFTP: `0x80`
`target name (tn)`	Name of the HiPath HG 1500.
`startup script (s)`	Startup script.
`other (o)`	`emac`

Table B-5 Start Parameters for Software Installation via Boot CLI

4. Once you have changed the start parameters, enter the `w` command.
5. Enter the extension `001` at the prompt. The file name is now *SW_IMAGE.001*. Confirm with `y`.
6. Wait until the data transfer is complete. If errors occur, check the values of the start parameters and the LAN cable connection and make sure that the FTP or TFTP server is operational.
7. Once the data has been transferred you will be asked if the changes made to the start parameters are to be saved. Press `y` to save your changes.

8. Now run the software with `@` and wait for the system to restart. The system is ready for use when the following message appears: `*** System Running`. The software currently active can now be displayed with `SW version`.

> If you want to delete all configuration data and other files, press `y` to perform formatting and confirm with `y`. Low-level formatting is not generally necessary – you can therefore confirm the query with `n`.
> Skip this step if you want to keep the configuration data.

E Internet References

The following Internet sources provide original or detailed information on technical standards used in HG 1500.

E.1 RFCs

RFCs (Requests for Comments) are official Internet descriptions of relevant network standards.

http://rfc.net/rfc793.html

RFC for the TCP protocol

http://rfc.net/rfc791.html

RFC for the IP protocol

http://rfc.net/rfc768.html

RFC for the UDP protocol

http://rfc.net/rfc2616.html

RFC for the HTTP protocol

http://rfc.net/rfc2821.html

RFC for the SMTP protocol

http://rfc.net/rfc1157.html

RFC for the SNMP protocol

http://rfc.net/std0009.html

Standard for the FTP protocol

http://rfc.net/rfc3550.html

RFC for the RTP protocol (Real-Time Applications Protocol)

http://rfc.net/rfc1994.html

PPP Challenge Handshake Authentication Protocol (CHAP)

http://rfc.net/rfc2030.html

RFC for the SNTP protocol

http://rfc.net/rfc1340.html

RFC for "Assigned Numbers" (protocol and port numbers) http://rfc.net/rfc1631.html

IP Network Address Translator (NAT)

http://rfc.net/rfc3022.html

Traditional IP Network Address Translator (Traditional NAT)

http://rfc.net/rfc3714.html

IAB Concerns Regarding Congestion Control for Voice Traffic in the Internet

http://rfc.net/rfc3715.html

IPsec Network Address Translation (NAT) Compatibility Requirements

http://rfc.net/rfc3762.html

Telephone number mapping (ENUM) service registration for H.323

http://rfc.net/rfc3508.html

H.323 Uniform Resource Locator (URL) Scheme Registration

http://rfc.net/rfc3709.html

Internet X.509 Public Key Infrastructure

http://rfc.net/rfc3647.html

Internet X.509 Public Key Infrastructure Certificate Policy and Certification Practices Framework

http://rfc.net/rfc3279.html

Algorithms and Identifiers for the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile

http://rfc.net/rfc3280.html

Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile

http://rfc.net/rfc3394.html

Advanced Encryption Standard (AES) Key Wrap Algorithm

http://rfc.net/rfc3670.html

Information Model for Describing Network Device QoS Datapath Mechanisms

http://rfc.net/rfc3644.html

Policy Quality of Service (QoS) Information Model http://rfc.net/rfc3555.html

MIME Type Registration of RTP Payload Formats

http://rfc.net/rfc3387.html

Considerations from the Service Management Research Group (SMRG) on Quality of Service (QoS) in the IP Network

E.2 Other Sources

http://www.protocols.com/pbook/VoIP.htm

Voice Over IP Reference Page

http://de.wikipedia.org/wiki/Voice_over_IP

Wikipedia article on "Voice over IP".

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